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REPORT

OF THE

CANADIAN FORESTRY CONVENTION

HELD AT

OTTAWA, JANUARY 10, 11 AND 12, 1906.

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1906

CANADIAN FORESTRY CONVENTION.

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CANADIAN FORESTRY CONVENTION.

The Canadian Forestry Convention called by the Right Honourable Sir Wilfrid Laurier, Premier of Canada, and held under the auspices of the Canadian Forestry Association, was opened in the Railway Committee Room, of the House of Commons, Ottawa, at 10 a.m., on Wednesday, January 10, 1906.

The meeting was called to order by the Right Honourable Sir Wilfrid Laurier, who invited His Excellency the Governor General to open the convention.

HIS EXCELLENCY THE GOVERNOR GENERAL.

Sir Wilfrid Laurier, Ladies and Gentlemen.—It is my privilege to open this Forestry Convention which has met on the invitation of the Prime Minister, to consider, and before it is too late, questions of the highest importance to the future well being of the Dominion. I do not propose to anticipate with more than a very few remarks of my own the addresses of the distinguished gentlemen who have been requested to place the results of their experience and their counsels at the disposal of those who form the opinion and make the laws of the Dominion. I will only say that although my experience of Canada has been comparatively short, it has yet been sufficient to impress upon me the urgent desirability of focusing the best brains of the Dominion on the immediate consideration of what shall be done with regard to our forests in order to protect the soil on which the maintenance of our agricultural prosperity depends.

I have myself seen in India, in Asia Minor, in Greece and in Italy, extensive tracts of territory once inhabited by a strenuous, prosperous, numerous population, and now reduced to the misery of a barren desolation through the unregulated deforestation of their lands by a blind and selfish generation who had no regard for posterity, and no eyes for anything but their own immediate requirements.

Gentlemen, there are no more melancholy reflections than those suggested by the sight of a country once rich and equipped with all the majesty and panoply of power, which has become a waste and a stony desert through the reckless improvidence of its own people.

It is the object of this convention to fix the attention of the people of the Dominion on the warning which these and other countries hold out to us as the practices we should carefully avoid, if Canada is to realize the high destiny which awaits her, or which will be realized if this generation is gifted with sufficient foresight and self-control to husband the resources so abundantly lavished upon the Dominion by a bountiful Providence.

It is because I hope that this convention may be the means of averting from every part of Canada the sad fate of those countries to which I have referred that I have gladly complied with the request that has been made to me to open this convention. I sincerely hope that the results which will flow from the convention he has called will realize the hopes of Sir Wilfrid Laurier. I am glad to see so many here, and I note

with peculiar satisfaction the presence of the eminent gentlemen from the United States who have come here in a spirit of fraternal sympathy and co-operation to give the great help of their assistance. I now, with great pleasure, declare this convention open.

ADDRESS OF THE PRESIDENT,
THE RIGHT HONOURABLE SIR WILFRID LAURIER,
Premier of Canada.

Your Excellency, Ladies and Gentlemen,—In the name of the Canadian Forestry Association, which has conceived and planned this conference, and in the name of the Canadian Parliament which has authorized and approved of it, it is my privilege and my pleasure to extend to you all a most hearty greeting. Welcome to one; welcome to all. Especially should I welcome, even after the words of His Excellency the Governor General, the representatives of the American Republic who are present with us on this occasion, and who bring to us the benefit of their knowledge and experience. Welcome also to the representatives of the provincial governments without whose aid and co-operation our efforts could never have the full fruition which we anticipate from them. Welcome also to the representatives of the great railway companies which are placed in a position to give, perhaps, more than any other class of the community, the benefit of their experience and knowledge to us. Welcome also to the representatives of the great lumbering class, who, perhaps, are more interested than any other class of the community in the maintenance, preservation and protection of the forests. Welcome to the university men whom we see before us, welcome to the traders, welcome to the sportsmen, welcome to all classes who are present, and who are ready to contribute of their time and of their money to the great object we have in view, and which is an object of primary national importance. The large attendance which I see before me, I am most gratified to say, exceeds all the expectations that we had, and this attendance, large as it is, is a manifest evidence that the Canadian people at last—at long last, realize the great importance of all problems connected with forestry.

A great deal of harm has already been done, harm, which, I am afraid, in many respects cannot be recalled, but it is not yet too late, and the harm which we know has taken place is and ought to be an incentive to us to do our best in the endeavour to check it and to give more attention to forestry problems. Our ancestors, when they came to this continent, found it an unbroken forest from the shores of the Atlantic ocean to the Mississippi valley. It was the home of a race of hunters who derived their existence chiefly from the chase, and for whom therefore the forest was a natural element. It was the object of our ancestors to turn this land into a fit habitation for a race of agriculturists, for the man whose civilization is based primarily upon agriculture. They had to clear their homes from the forest, but instead of attacking the forest with care and tenderness they looked upon it as an enemy to be got rid of with the axe, with fire, and with every mode of destruction. History tells us, and our own experience tells us, that they went at it most mercilessly. The forest had no friends whatever, because to clear off a few acres of land they would set fire to miles upon miles of the noblest trees that ever lifted their lofty heads towards the heavens. This, at one time or other went on in every part of the continent, and even at this very day it is still going on in some part of the continent. These pioneers of former days, as

the pioneers of these modern days, did not realize, did not appreciate that in the economy of nature forests are just as indispensable to the civilization of man as tilled fields. They did not appreciate that even from the point of view of agriculture unless tilled fields are furnished by forests with moisture and rainfall, they decrease in their productiveness accordingly, and that the efforts of the agriculturist will suffer in proportion. We have assembled here in order to devise ways and means, if possible, first of all to check this evil and to make every class in the community realize the great importance of maintaining, preserving and protecting our forests. What I would like to call the attention of this convention to, in the first place, would be the necessity of establishing, if it has not been done, and it has not yet been done, a preserve, a large forest domain. We must know, and the experience of those nations to which His Excellency in his address has just alluded, teaches us that there are certain portions, certain sections of the earth's surface which, in the wise economy of nature, must always be maintained as forests, and that our watersheds must be maintained as forests. All the hills, mountains and plateaus which are the sources of flowing streams or rivers, should never be allowed for any consideration whatever, to remain anything else than forest. No consideration whatever should allow these portions of the earth's surface to be denuded of their trees. We know the consequences, and therefore it is needless for me to dwell upon that feature; it is a mere truism.

But, what I want to call your attention to is that if these portions of the earth's surface in our own country are to be maintained as forests it is essential, in my humble judgment at all events, that they should form part of the national domain, that they should belong to the state. In Canada by the state I mean the provincial governments where the management of the public lands is left to the provincial governments, and the national government where the ownership of public lands is left to the national government. If it so happens, and I am afraid it has happened, that some portions of these watersheds have been alienated from the public domain and have been transferred to private ownership, it should be the policy of the national government and it should be the policy of the provincial governments to repurchase these lands and bring them back to the public domain.

The state of New York has inaugurated such a policy. The state of New York years ago made the mistake—I was going to say committed the folly, and perhaps that word would not be too strong—of alienating part of the watershed of the Adirondack mountains. We know the fatal consequences that have arisen from that policy in the droughts which have more than once been the bane of that beautiful state. And now, I understand, the legislature of the state of New York have passed laws authorizing the administration, as fast as possible, to re-acquire these lands and make them a part of the public domain. If, in any part of Canada, a similar mistake has been made, a policy such as that adopted by the state of New York should be adopted here, and the national or provincial government whose business it is should make it their object to bring back to the public ownership the lands that have been alienated, and make these forests a part of the national domain, as is done in Germany, France and some other countries. On this point, I am sure, we all agree.

The next consideration for which I would invite the deliberation of this convention is the reproduction of the forests. Our system of treating the forests is to lease them to the lumbermen for the purpose of taking off the merchantable timber. I do not know whether this policy is advisable or not. I believe that, on the whole, it is

advisable. But no effort is made to replace the timber that is taken away from what we call the limit under that policy. In Germany and France, I understand, it is the accepted policy, a policy that has been followed for generations, when a tree is removed in any way to replace it by the planting of another tree. I am not prepared to say that such drastic conditions should be imposed upon the lumbermen—though I am not prepared to say, on the other hand, that a plan of this kind should not be taken under advice. At all events, I submit to this convention that we ought to do something more than we are doing at the present time. It is not fair to the country—it is not fair to us who are living, and still less is it fair to the generation to come after us—that we should allow the destruction of the forest to go on year by year by the cutting down of the trees and make no effort whatever to replace what is thus taken away. The trees are a crop like any other growth. True, they are a crop of slow growth, but that is the only difference between trees and any other crop. In this, as in every case, when a crop is taken off, steps should be taken to replace it at once with another. I said a moment ago that I was not prepared to say that when the lumberman, in the course of his work, takes away say, 300,000 trees in a year, he should at once plant 300,000 trees. But I do ask this convention to consider what should be done in that matter. One thing might be asked, whether of the lumbermen or of the state; that, where trees are taken away, trees should be seeded, so that we may have a crop coming on all the time. It is a fact which we face with some degree of sadness, even mourning, that Canada, in a few years will be devoid, absolutely devoid, of the beautiful pine forests which at one time were its pride. We can calculate the number of years—and the number is not very great—when there will not be another tree of the original forest to be cut upon the limits of the Canadian lumbermen. But, trees have grown and trees ought to grow again. There is an impression which I have heard expressed on more than one occasion, that it is useless to look for another crop of pine trees—that when you have removed the crop we found here, the growth of many years, the new crop of trees will be spreading and of no merchantable value. But I am told that there is a way whereby a new crop of trees can be grown. The growth should be started as soon as the original trees have been removed from the soil. A few years ago I was discussing this subject with a lumberman of great authority, a man known to some of you, the late John Bertram, a man most eminent in his profession, and of the highest capabilities in many directions. He told me that, on his limits on Georgian bay, he had a young crop of pine which he had started a few years before. The explanation he gave me was this—and I am glad to give here the information he imparted to me, so as to gain the opinions of those who have experience in these matters—he told me that, when the crop of pine was cut off, the new crop to spring up would consist largely of poplar, and the poplars grew faster than the pine or hardwood trees. And he said: If you take care to plant pine seeds underneath these poplars, the young pines will grow up shaded by the faster-growing trees. The pines, in their efforts to reach the sunlight, will grow tall and without limbs. After a time, when they overtop the poplars, their life is assured. If this be the case, it seems to me we have here a method of reproducing our trees and of having, for all time, a constant supply. (Applause). It is a natural thought that we shall not live to see this young generation of trees at their full growth; but, as has been stated a moment ago by His Excellency the Governor General, we must not think alone for ourselves, we must think of the

prosperity of Canada in the days when all of us shall be sleeping in our graves. This is the sentiment, I am sure, that actuates this entire assembly. (Loud applause).

The next thing I would like the convention to consider is the protection of the forest against its many enemies. For the forest, unfortunately, has many enemies. Man is bad enough, we all agree; but man is not so bad as the insects, and the insects are not so bad as fire. The fire is the great enemy of the forest. Nothing can be sadder for us to consider than that, during the summer months there are miles and miles of forest destroyed by fire. This goes on every year. Speaking of my own experience, it has been going on ever since I can remember. It goes on, perhaps, not to so great an extent as in former years, but there is far too much of it yet. I was talking, a few years ago, with one of the lumbermen of the city of Ottawa, and he made the statement to me that the enormous quantity of lumber taken to market out of the Ottawa valley does not represent more than ten per cent of the timber that has been destroyed by fire. If this is a true statement the fact is simply appalling. Last week, I met one of the lumber kings of the Ottawa valley, who asked me, 'What are you going to do at this Forestry Convention?' I said, 'We are going to compel the lumbermen to protect the forest against fire.' He replied, 'Why, the lumbermen are doing more in that direction now than all the rest of the community put together.' I said, 'I quite believe it. But that is not saying very much for the lumbermen. Because the rest of the community does absolutely nothing to protect the forest, and the lumbermen may well be doing more without doing enough.'

What measures ought to be taken to protect the forests against the raging fires that every year consume such an appalling quantity of the best timber of the country? I know that the lumbermen keep a patrol of the woods of the Ottawa valley. And that is a great improvement. But I submit, that this is not enough. I submit that something more ought to be done, if it be only to have more patrolmen. I believe that we should have the woods patrolled as they are in Germany and France, so that, as far as possible, every incipient fire should be prevented from spreading. Moreover, we should impress every man in Canada—the lumbermen, the sportsmen, the man out of any class—with the belief that it is a crime, an absolute crime to throw a lighted match upon the ground, to scatter the ashes of a fire, or to leave a camp fire before it is absolutely extinguished. All these things are crimes and I would go so far as to say that they should be made crimes under the law.

There is another mode of destruction to which I want to call the attention of the convention and it is the destruction by the railway locomotive. The railway locomotive is a great blessing undoubtedly, and I am not here to say anything harsh of it, but if you take the train at Halifax to go to Vancouver, in every province of the Dominion, where there is timber, in Nova Scotia, in New Brunswick, in Quebec, in Ontario, in British Columbia, you will see miles and miles and miles of what was once beautiful forest and which is now nothing but parched and blackened timber, a monument to the destructive power of the railway locomotive. I know that the railway men have done a great deal to obviate this evil. They use all possible ways of overcoming the difficulty inherent to the operation of the railway locomotive. They have put screens upon their stacks, they have devised different methods, but all these methods have been inadequate, and I do not know that in that direction they can do more than they have done, but perhaps the railways ought to be compelled in the summer season, at all events, to have extra patrolmen on their tracks so as to prevent incipient fires, to follow

sparks in their progress and to extinguish them before they have caused any damage. I think that is one question that ought to be carefully considered by this convention, and I believe that if it were to do nothing more than to prevent fires by railway locomotives this convention would have done a great deal, but I think it will do more than that.

There is another subject to which I would also invite the attention of the convention. That is tree planting. It is not sufficient that we should preserve our forests where we have forests. It is not sufficient that we should plant forests also to a great extent, but we should invite people generally to give more attention to tree planting at their homes, and especially upon their farms. The Canadian government, some eight years ago, introduced into one of its departments a forestry branch. It has done a great deal of good in that respect, and I hope that Mr. Stewart, who is the administrator of this branch, will give us some information as to the work which he has done. It has done a great deal already to my certain knowledge, and to the knowledge of every one who has been in the North-west. It was my privilege last September to visit the province of Manitoba and the new provinces of Saskatchewan and Alberta. Fourteen years had elapsed since I had seen them before, and of all things which struck me in this wonderful country, the thing which perhaps gladdened my heart more than anything else, is the attention which is given to forestry. Fourteen years ago when I first visited the province of Manitoba and the Territories of Alberta and Saskatchewan, the farms were absolutely barren of trees; you could not see a tree around them. Now, I am glad to say that around most of the farms in Manitoba and many in Saskatchewan and Alberta, you can see groves of trees. The city of Winnipeg has done marvels in the way of tree planting. The streets of Winnipeg to-day are a credit to that city, and would be a credit to even an older city than it is. But there is a great deal to be done in the east, and in that respect my own province of Quebec is perhaps the greatest sinner. My own countryman, the French-Canadian, is the man with the axe. There is no better man in that respect than he. He goes into the forest, and there is no man who can equal him in forest work, but in the meantime, he has not been as careful as he should have been in preserving the trees in his midst. I should like to impress upon every Canadian farmer the necessity of covering with trees every rocky hill and the bank of every running stream. It is very easily done. He has only to scatter the seeds on the ground, fence it and nature will do the rest. These are some of the questions which I hope will be taken into consideration by yourselves. I do not intend to limit the number of questions which shall be taken into consideration, but these are some to which, with others, I invite the serious attention of this convention. I have much pleasure in calling upon Mr. R. L. Borden, the leader of the Opposition in the House of Commons.

MR. R. L. BORDEN, M.P.,

Leader of the Opposition in the House of Commons.

Your Excellency, Sir Wilfrid Laurier and Gentlemen,—I welcome the opportunity of being present at this convention, and of expressing my appreciation of the importance of our forest resources. To men familiar as you are with the subject, all that I can say must seem trite and commonplace; but I venture a few remarks merely for the purpose of indicating my interest in this great question.

Canada is remarkable not only for the extent and variety of her resources, but for the diversified nature of the country and for its remarkable beauty. In the east we

have Quebec and the maritime provinces with their magnificent coast lines, their forests, their agricultural and their mineral wealth. Thence there extends inland through Quebec and through the sister province of Ontario the greatest inland waterway in the world, connecting the ocean with the broad prairies of the west. Great rivers reach down from the forests of the north. On the western coast we have another great maritime province abounding in forest and mineral wealth.

Of all our wonderful natural resources none are more important than the forests. Their conservation is undoubtedly more vital to our future than is generally realized. 'How foolish,' says a great authority, 'how foolish does man appear in destroying the mountain forests, for thereby he deprives himself of wood, water and soil at the same time.'

We are apt to regard our forests as limitless and our forest wealth as unbounded; but public attention has already been directed to certain dangers and to some of the more threatening elements of destruction and waste. Something has been done to check forest fires, yet what devastation they have wrought. Practical men tell us that twenty times as much has been sacrificed to flame as to the lumberman's axe. An illustration mentioned at the last session of the Canadian Forestry Association may be given. A settler in the province of Quebec in order to clear the ground for a five-bushel crop of potatoes started a fire that destroyed three hundred million feet of pine, which to-day would be worth \$3,500,000. Measures have been taken in many of the provinces to prevent such destruction, but those who can speak with knowledge declare that much yet remains to be done. Many of us, although not actually concerned in forestry or in the lumbering industry, have had occasion to tramp perhaps for half a day or more through forests ravaged by fire. There one can see the very abomination of desolation spoken of in Scripture. Then follows erosion of the soil consequent on the destruction of tree and plant life, and this in turn works similar havoc. The waterways cease to be highways. Rivers cease to be channels of commerce and become raging instruments of destruction.

The importance of the subject has been most forcibly expressed by Dr. Fernow, director of the New York State College of Forestry, and an eminent authority on the economics of forestry. He says:—

'While we are debating over the best methods of disposing of our wealth, we gradually lose our very capital without even realizing the fact. Whether we have a high tariff or no tariff, an income tax or head tax, direct or indirect taxation, bi-metallism or a single standard, are matters which concern, to be sure, the temporary convenience of the members of society, but this prejudicial adjustment is easily remediable. But whether fertile lands are turned into deserts, forests into waste places, brooks into torrents, rivers changed from means of power and intercourse into means of destruction and desolation—these are questions which concern the material existence itself of society, and since such change becomes often irreversible, the damage irremediable, and at the same time the extent of available resources becomes smaller in proportion to population, their consideration is finally much more important than those other questions of the day.'

Let us consider for a moment the extent of our forest resources in Canada, their value from a mere monetary standpoint and the importance of their conservation. Dr. Fernow estimates that our nominal forest area comprises eight hundred million acres, but that the actual available area does not exceed four hundred million acres. To

understand what this implies and what it means to us in the future let us see what has been accomplished elsewhere. In some parts of Europe the forests are under state control, that is to say, not only the ownership but the management of the forests is vested in the state authorities. I do not suggest that any such course should be adopted in Canada, but we may learn from their experience what can be accomplished by wise measures and careful management. Saxony has under state control 430,000 acres of rough mountain land—an area not larger than an average county in Canada. From this she has taken two hundred million dollars in the past fifty years. During that time the cut has been doubled and is of infinitely better quality than it was fifty years ago. Then only 17 per cent of the cut was serviceable, now 79 per cent is serviceable and the standing wood in the state forests has increased by no less than 16 per cent. The gross revenue per acre has increased from \$1.75 to \$6.67, and the net revenue per acre from 95 cents to \$4.37. Canada possesses a forest area one thousand times greater than that of Saxony. Make all reasonable allowances and then estimate what untold wealth this country possesses so long as the harvest of the forest continues.

What can we do in Canada to conserve our forests? The capitalist desires immediate profit, while the public interest requires that our forest area should be exploited not only with a view to the important consideration of profit but with due regard to continuity and to the preservation of these great natural resources. The forests if judiciously managed may bear a crop once in fifteen or even in ten years. If destroyed the crop cannot be renewed in less than a century. The object to be attained is continuity and conservation of the forests which are to be regarded as capital upon which individual enterprise shall not be allowed unduly to trench. We must of course have regard also to the necessity for a certain immediate profit to the capitalist who has invested his money and who has a right to carry on his operations as well as to the requirements of legitimate and bona fide settlement. How shall all these objects be obtained? The state can assist by aiding education in forestry as well as by direct control exercised through state regulation.

Along these lines the Canadian Forestry Association is working. Along these lines it is entitled to and should receive the assistance of our parliament and legislatures. I have very great pleasure in assuring you that not only do I take a deep interest in the subject but that I shall be prepared to support any reasonable measures within the limits of federal authority which may be devised for aiding in a work of such vital national importance.

HON. FRANK OLIVER,

Minister of the Interior.

It is a privilege which I appreciate very much to take part in the deliberations of this convention, the object of which is so important to our country. As the special agent of this Dominion government having the responsibility for the management of its estate, it is for me specially to speak of what has been done, what is being done, and what is hoped to be done in regard to the territory in the great North-west which is at the present time under the direct management of the Dominion government. There the question is the direct opposite from what it is in these eastern provinces. Here the great question is the preservation of the forests with some small part of attention to reproduction. There, the great question is not preservation; it is creation of the forests, with a small part of attention to the preservation of such forests as there

are. Everything that has been said here or elsewhere in regard to the necessity of woods to successful agriculture is borne out not only by the scientific knowledge that has been acquired regarding the North-west, but also by the experience of the people who have lived there. It is accepted as a fact that the forest brings rainfall. We know that the forest is an evidence of rainfall and that the forest brings rainfall. It is interchangeable. If you have the woods you have the rain and by getting the woods you get the rain. It was some time before I assumed the responsibility in this connection that the government took up this question of forestry in the west and while the requirements are so vast as they are—I say vast in comparison even with the available resources of this great country—it cannot be expected that the conditions have yet been met or even measurably met. The area of the North-west is so great and the conditions of lack of forest have prevailed for so many years, for so many ages, it may be said, and these conditions are so different from those prevailing in the rest of the Dominion that it would scarcely have been the part of wisdom to have undertaken the work of reforesting the prairie on theoretical knowledge or the experience of other countries. Although this is not a Conservative government its measures in this matter have been to some extent conservative. They have looked to action upon known lines and to actual experiments for something upon which to base their future action. As regards the preservation of the sources of water supply it is the high or hilly country, which in the west is generally forested; in fact, in that country forest and hill are so intimately associated that there a piece of woods is called a ‘bluff’ or ‘hill.’ In the United States the word ‘bluff’ is used to mean a hill, but in the North-west the word ‘bluff’ is used to mean a clump of timber, the idea that there must be a hill if there is timber being so well grounded in the public mind by the facts as they exist. So that, one of the first things that was done by the government in this matter was to take measures to preserve from deforestation wholly or partially forested areas in the North-west by creating timber reservations in these localities. This, however, is a much easier matter to deal with sitting here in this comfortable room in this capital city of the Dominion, than it is where you have to deal with a large number of very energetic, enterprising people who require that timber for the very preservation of life. It is therefore a question which cannot be dealt with offhand; it must be considered from varying and directly opposite points of view. The government has necessarily been cautious in this matter, but it has made very considerable advances and hopes to make more as circumstances permit. That is in regard to the preservation of forest areas which will preserve the water supply in the surrounding country. Besides this there is, in the northern and north-western parts of the Territories a very great area of country which is principally forested, and there I would like to say that what the premier has said in regard to the destruction of forests by fire applies to a tremendous extent. I think he said that in the Ottawa valley the total destruction of timber was 90 per cent by fire to 10 per cent by the lumbermen. I think that in this forested area I speak of in the North-west where the timber is especially valuable because of the requirements of the prairie country the proportion would be 99 per cent by fire and 1 per cent by the lumbermen. Every year there is a destruction by fire of timber of stupendous value, not so much in money value as in the value that the timber is to the settlers in the adjacent country where there is no timber. A difficulty arises in dealing with this question. There is a vast area of timber which has no immediate money value and when it becomes necessary for the government to ask the par-

liament of this great country, this parliament which concentrates the intelligence of Canada—for liberal appropriations for the patrol and protection of these forests the request is likely to be closely queried as to where the reputation of this Liberal government for economy has evaporated to. There is in that country a vast area of timbered land, and that timber has a value altogether beyond its commercial value. It is being lost year after year to a stupendous extent, and if it is necessary to take active measures for the patrolling of those forests to secure their preservation against fire, I hope the results of this convention will be of such a nature, and will have such weight with parliament that it will not be difficult to get the money required to secure the protection of these very necessary and valuable forests.

Then, there is the great question of the creation of forests or woods on the prairie. There are limitations in that direction which people in this part of the country can scarcely appreciate. Here you have actually to fight the timber to keep it from growing. I do not find fault so much—if I may be permitted to differ from the premier—with the instinct of those people in this part of the country which prompted them if they saw a tree to cut it down, because it was either the people or the tree. If the trees were here we would not be here. The trees had to be destroyed in order that the people might live. But in the North-west it is different. There, it is difficult to grow trees. There you have the Chinook to contend with, and in speaking of the growth of forests in the west I may say that it is not the cold of the winter in the west that prevents forest growth; it is the Chinook wind, the mild wind that changes the temperature during the winter and produces conditions of dryness in the early part of the summer which presents the greatest difficulty in the growth of forests in the west.

The department is grappling with the question in a conservative, yet in a progressive way; in fact, it has adopted a truly liberal-conservative method of dealing with the question. We have established a forestry station under the superintendence of Mr. Stewart, and under the management of Mr. Ross, and I, having recently had occasion to visit that locality, have been credibly informed that the forestry station is doing good work, that the work is being very highly appreciated by the people of the country and that, as the result shows, very considerable progress is being made, as the premier has borne witness, in regard to the growth of trees. But the greatest progress that is being made is not in the number of trees that has been grown, but it is in the practical knowledge that has been acquired as to the growth of these trees, and when the knowledge has become well established, we hope to be able to extend our operations to a greater degree so as to produce wider and quicker results. That is the position in the west in regard to forestry. Here it is to some extent—to some extent, may I say?—a question of argument, an academic question; there it is a question of the highest importance, the greatest and deepest importance, and everybody in the country understands it to be so. Therefore, any result which may come from the deliberations of this convention, which will lead in any way towards increasing our knowledge of the means to preserve existing forests or create new, especially means which may be applied to the western country, will be more than welcome by the government, by the Department of the Interior, and by the forestry branch of that department.



ASPEN REPRODUCED YEARS AFTER A FIRE IN TURTLE MOUNTAIN FOREST RESERVE, MAN.

MR. E. G. JOLY DE LOTBINIERE,

President of the Canadian Forestry Association.

Since the far-off days when Champlain first established his little colony of hardy pioneers on the shores of the St. Lawrence, where Quebec now stands, the forest has, until within comparatively recent times, been looked upon as the sternest and most relentless of the many enemies the settler has had to contend with.

Little by little, but surely and steadily the settler, with axe and fire, overcame and annihilated his mighty enemy. Where 300 years ago, nature's stern old guard of forest giants held undisputed sway, now flourish large and populous towns, thriving villages and untold acres of magnificent agricultural land, wrested at the cost of bitter toil and labour from the primitive owner—the forest.

Is it strange that our ancestors, who for generations had to fight and destroy the forest in order to secure the bare means of existence should have transmitted to us their descendants a certain inborn, hereditary desire to 'strike' and not count the cost, or think of the future, whenever confronted with the ancestral enemy?

In the old days, the forest had but one serious enemy—the settler. To-day it has many. The settler is yet to the fore, with his axe and his devastating ally, fire.

The lumberman, naturally intent on speedy returns and too often indifferent to the interest of those who may come after him, hews and hacks himself out a fortune as rapidly as he may, leaving the future to take care of itself.

Those great pioneers of civilization and progress, the railways. What price have we not paid for the good they have done? Millions of desolate barren acres, destitute of the noble forests that once were their glory, are there to answer the question.

Our legislatures have long been aware that the ruthless war waged for generations against the forest must be stopped, and that wise and conservative methods should be introduced, to regulate the settling of our forest lands and the rational exploitation of our forest wealth.

Within the last few years radical measures have been adopted by the federal and provincial governments to attain these ends, measures to which I will presently have occasion to refer more fully.

It is to assist our legislatures and arouse public interest in the protection of our great national heritage, our forests, that associations such as ours have their '*raison d'être*.'

To Mr. E. Stewart, Dominion Superintendent of Forestry, our honoured and respected vice-president, is due the credit of having organized the Canadian Forestry Association. In 1899 Mr. Stewart was appointed Chief Inspector of Timber and Forestry for the Dominion. Encouraged by the success which had attended the work of the American Forestry Association, Mr. Stewart thought that a similar organization for Canada would be the best means of arousing the public to a sense of the necessity of taking a real live interest in all questions affecting our forests, their preservation and administration.

To that end he called a meeting of gentlemen interested in timber and forestry, and among those who were present we find the names of Sir Henri Joly de Lotbinière,

Mr. J. R. Booth, Mr. James Smart, Dr. Wm. Saunders, Mr. William Little, Mr. Thos. Southworth, Professor Macoun, Mr. William Pearce, Mr. T. C. Keefer, Mr. C. H. Keefer, Mr. Mackenzie and Mr. W. T. Macoun.

A committee was formed with instructions to call a meeting of all persons interested in forestry, to be held in the city of Ottawa, in the month of February following, to consider the formation of an association to promote forestry in Canada, and also to prepare a constitution and by-laws for the projected association.

This meeting took place in the room we are now occupying on March 8, 1900, and led to the formation of the Canadian Forestry Association.

The association has now had six years of existence, and has during that period strenuously endeavoured to keep the cause of forestry before the public.

The objects which our association has persistently advocated are practical ones, and if carried out, would perpetuate indefinitely our forest wealth, guarantee the permanence of our magnificent water-powers and be of lasting and inestimable benefit to the farmer and agriculturist.

Briefly stated they are as follows:—The preservation of the forests for their influence on climate, fertility and water supply; the exploration of the public domain and the reservation for timber production of lands unsuited for agriculture; the promotion of judicious methods in dealing with forests and woodlands; re-afforestation where advisable; tree planting on the plains and on streets and highways, and the collection and dissemination of information bearing on the forestry problem in general.

For the first five years of the association's existence, our means did not permit of our publishing any journal or periodical, but by an arrangement with *Rod and Gun*, a Canadian sporting magazine, published monthly, a certain space in the magazine was reserved for the association, and articles bearing on forestry were given a prominent place. The federal government has so far most generously published the reports of our annual meetings, which have been widely disseminated.

Thanks to the generosity of the governments of the provinces of Ontario, Quebec and British Columbia, we now receive, apart from our membership fees, annual grants which amount to the sum of \$600. This aid has enabled us to publish a quarterly journal devoted to the cause of forestry. We trust that before long our means will permit of a monthly publication.

In 1900 our membership was but 369, to-day it is not far from 1,000.

We have had as patron of the association the Earl of Minto, our late Governor General, and now the position has been graciously accepted by His Excellency the Governor General.

Among our ex-presidents we number Sir Henri Joly de Lotbinière, Mr. Hiram Robinson, Mr. William Little and Mr. Aubrey White.

I cannot let this opportunity pass without drawing attention to the sympathy and support shown the association by the Bank of Montreal, the Merchants Bank and the Bank of Commerce. The Bank of Montreal pays the subscription of each of the managers of its 88 branches. The Merchants Bank pays the subscriptions of fifty of

its managers. The Bank of Commerce the subscription of the managers of ten of its branches. The liberal minded policy of these institutions is deserving of the highest praise and well worthy of imitation.

I also avail myself of this occasion to testify to the admirable and practical work done by the federal government in the way of forest tree planting on the plains of the west, protection of forest lands from fire, and creation of forest reserves.

The forest tree planting work, as at present conducted, was inaugurated in 1901. Its objects are two-fold. The one educative, the other intended to give practical aid and benefit to the settler. Briefly the system is as follows: Any person wishing to avail himself of the co-operation of the government in planting out shelters, forest plantations or wind breaks, makes application to the Superintendent of Forestry at Ottawa, before the first day of March, in the year previous to the one in which it is wished to do the planting. This notice is necessary in order to enable the department to provide ahead for the supply of nursery stock for spring plantations, and to allow the inspector or agent time to visit the land where the plantation is to be made.

Every application is tabulated and next season the inspectors go out and visit the farms. Prior, however, to the inspectors' visit, the applicant for trees receives a circular from the department informing him how he should prepare his land to receive the young trees. The inspector makes his visit, studies the character of the soil and decides what kind of trees are suitable, gives the applicant a working plan and instructs him when, where and how to plant. The government has always so far supplied the seedlings free of cost from their nurseries on the experimental farms at Brandon and Indian Head. Since 1901, 5,102,750 trees have been distributed and planted, and a large quantity of seed has also been furnished to applicants. The inspectors report that 95 per cent of the trees planted this year are living, and Mr. Stewart estimates that of the trees planted during the last five years, 85 per cent are thriving. The replanting of the sand hills of the spruce timber reserve in Manitoba has also been undertaken with success, and the government intends continuing the work.

The Dominion fire protection service has also been put on a sound and efficient footing. Forty or fifty fire-rangers are employed during the dry months, with power to engage additional assistance when necessary to fight fires. During the past season, which was exceptionally dry in British Columbia, a great number of men were employed for short periods in fire protection work. The result has been that the government lost practically no timber of commercial value on its lands.

The policy of setting aside forest reserves has been vigorously followed by the Dominion government and 3,449,600 acres of timber land have been set aside in Manitoba, 5,612,800 in the North-west Territories, and 624,480 in British Columbia, making a total area of Dominion timber reserves of 9,686,880 acres. Further legislation may be shortly expected to facilitate the creation of reservations for the protection of timber, as well as fish and game.

The province of Ontario has, within the last few years, taken up the subject of practical forestry in a very thorough and efficient manner. Among the many conservative features that have been introduced, I wish specially to allude to her fire ranging service and her wise policy of setting aside large tracts of forest land, as perpetual forest reserves.

In 1885, the first year in which the Ontario Fire Protection Service was put in operation, 37 men were employed in the service, at a cost of \$7,911, half of which was afterwards refunded to the government by the licensees. In 1904, 318 fire rangers were constantly on duty in the forest, exclusive of those employed in the forest reserves and in the Algonquin Park. During the present year an additional staff of 20 fire rangers were employed along the line of the Temiscaming and Northern Ontario Railway, which was under construction.

The careful patrolling of railway lines passing through our timbered districts, and those in course of construction, constitutes a most important feature of the provinces's excellent system and should be generally adopted.

The fire ranging service of Ontario for 1904, entailed the expenditure of \$82,589.48, \$42,989.48 of which was paid by the Department of Crown Lands, and the balance by the licensees. Apart from the cost of fire ranging, the department spent \$33,391 on forest ranging, \$10,199 on its forest reserves, and \$10,176 on its parks.

Ontario has now over 9,000,000 acres in forest reserves, and with her progressive forestry policy, will not, I am sure, rest satisfied until at least 25,000,000 acres of forest land are set aside to form a magnificent, permanent Crown forest.

Practical forestry is also receiving serious attention in the province of Quebec.

In 1893, a fire protective system was inaugurated in the Upper Ottawa agency. A superintendent was appointed with a limited number of rangers under his orders. The government controlled and paid the staff, but collected from the licensees 50 per cent of the outlay. The expenses incidental to fighting fires were also divided between the government and the licensees. In the rest of the province a few men were employed here and there, but beyond posting up notices and interviewing settlers now and then, nothing was accomplished. In 1897, the experiment tried in the Upper Ottawa (Fire District No. 1) having been found satisfactory, the system was extended as far east as the St. Maurice basin, which was erected into a fire district (No. 2).

The government made no further change in its policy until 1904, when the limit holders were asked to consider a proposal by which they should pay 25 cents per mile fire tax, the government promising in return to provide an adequate staff of fire rangers. The limit holders met this proposal with a counter one, viz., that the fire tax should be abolished and that they, the limit holders, would undertake the task of patrolling their limits at their own cost if permitted to select their own rangers, who after selection, should be officially appointed fire rangers by the government, and vested with the proper authority to act. The government was also to pay one-half of the cost incurred in extinguishing fires, as well as the cost of patrolling railway lines passing through Crown Timber lands. The government agreed to the proposals of the limit holders and the scheme has been in operation during the past season. That portion of the province east of the St. Maurice river was also divided into three fire districts.

The result of this new departure has proved entirely satisfactory both to the lumbermen and to the government, and instead of a dozen men or so, moving about the vast area now included in Fire Districts 3, 4 and 5, 134 fire rangers were on duty there during the past season. Under this new system political appointments have become an impossibility, as the limit holders select their own men, and naturally only employ those thoroughly well qualified to fulfil their duties.

The success of this tentative measure has been such, that the government has now placed the whole province under the same system.

To emphasize the interest that the Department of Crown Lands is taking in the all important question of protecting its timber lands from fire, I may mention that a special branch has lately been created, and placed under the charge of an experienced officer, called the 'Chief Protector of Forests.' With a good fire protective system, and a well organized special service to see to its execution, forest fires in Quebec should now be of rare occurrence.

Quebec has also adopted the policy of creating forest reserves. In June, 1895, the Laurentides National Park was created, comprising nearly 1,700,000 acres. During the past year the Gaspesian forest reserve of 1,500,000 acres was set aside and 422,000 added to the Laurentides National Park. Quebec has now 3,622,000 acres in forest reserves, and intends shortly to add extensively to the reserves already made.

In 1885, the legislature of New Brunswick passed a Fire Act, excellent in its provisions, but so far the province has no organized staff of fire rangers to see to its execution. The Surveyor-General has power to employ aid during the dry season, but the expenditure for fire protection so far has been small, little over \$2,000 per annum, and out of proportion to the revenue derived from the mileage and stumpage on Crown lands, which in 1904 amounted to \$257,016.68.

New Brunswick is, however, waking up to the necessity of adopting more energetic measures for the protection of her Crown Timber lands. An Act was passed on April 14 last, providing for the prevention of fires in connection with the survey and construction of the National Transcontinental railway and other railways passing through forest lands in New Brunswick.

This wise and prudent measure cannot be too highly commended and will no doubt be the means of saving thousands of acres of valuable timber lands to the province.

The area of Crown Timber lands in Nova Scotia is small, not exceeding 1,516,631 acres, but the government is alive to the necessity of protecting what it has. Nova Scotia has had a Fire Act on its statute books since 1883, but it has accomplished nothing in the past, as no effective machinery had been provided for putting it into execution until 1904. An Act was then put in operation in several counties, and has proved most effective. Re-afforestation and the setting apart of tracts of land at the head of navigable rivers, is also receiving serious consideration.

British Columbia, with its unparalleled forest wealth, has so far done very little towards protecting its forests. The province has a 'Bush Fire Act,' but the difficulties of enforcing it in a country but sparsely settled are great. An effort, however, should be made, and no doubt will soon be made to enforce its provisions, at least in the vicinity of railways, settlements and where lumbering operations are being conducted.

I have already alluded to the aims and ambitions of the Canadian Forestry Association, and I trust that it will not be considered presumptuous on my part, to ascribe in a measure, the interest that has been awakened all over Canada in forestry matters, to the efforts of our association.

The association is highly sensible of the honour the Prime Minister of Canada has conferred upon it, by permitting this convention to be held under its auspices. It is a most gratifying recognition of our work, and by redoubling our activity, we hope to prove to the Federal and Provincial governments, and the public at large, that the aid and consideration we have so far received have not been misplaced.

We trust that before long steps may be taken to organize a Canadian forestry school, where our young men may be enabled to receive a forestry education of a character suited to the needs of our country.

Apart from the great benefit the country at large will derive by having its forestry interests confided to the care and management of thoroughly well trained men, a new career of usefulness will be opened to young Canadians, who will be enabled to devote their energy and talents to the welfare of this country.

On behalf of the Canadian Forestry Association, I thank His Excellency, the Governor General, not only for the honour conferred upon us to-day by his presence here as Honorary President of this convention, but also for his interest in and sympathy with every movement that tends to the protection of our forests.

To you, Sir Wilfrid Laurier, the public of Canada owe a debt of gratitude for the summoning of this convention. Its results for good will be far reaching. It will serve more than anything else could ever have done to destroy the apathy and lack of interest of those, who from ignorance or want of information have failed to recognize the vital importance to our country of the work we are engaged in.

Among Canada's many proud titles to recognition, that of her forest wealth stands pre-eminent. To utilize that grand asset to its utmost, without impairing its perpetuity, should be the aim of practical forestry in Canada. Be assured, sir, that the holding of this convention will have contributed in a notable manner to the attainment of that end.

MR. GIFFORD PINCHOT,

Chief of the United States Forest Service.

Before saying a word about forestry on both sides of the line which divides our two nations, I have the great honour and pleasure of bringing to His Excellency, the Governor General, and to you, Mr. Chairman, a personal message from the President of the United States. I am to express to His Excellency the warmest personal regard of the President, and to you and to the members of this convention his heartiest good wishes and good-will, and his confident, and to him most welcome expectation of good result to Canada from the work of this convention. And I am to say to you that the President's own belief in the fundamental, vital and immediate importance of forestry grows stronger year by year.

For myself I may say that, so far as I know, there has never been, at any time, or in any place, a warmer or more effective friend and supporter of forestry than the President. It is a very great satisfaction to me to know that he is threatened with a rival in Canada in your own person.

I am the bearer also of a message from Hon. James Wilson, Secretary of Agriculture of the United States, my honoured chief, who has asked me to express to you his appreciation of the wisdom which called this convention together, and to express his

good wishes for the permanent success of its work and to tell you of the pleasure he has had in sending a representative to be present at your deliberations.

You have called this convention in recognition of the vital importance of forestry to Canada. Forestry is more closely, and I think it fair to say, more tremendously involved in the prosperity and well-being of the American continent north of the Mexican border than in that of any other area on the face of the whole earth.

Timber and water in the east, water and timber in the west, are the great products of this great beneficent cloak of forest which has been spread over so much of our land on both sides of the line. We are apt to consider it as simply a truism, when we say that forestry is important. Well, it may be a truism, but it is one of those truisms that need not only to be made widely known, but to be realized and acted upon. For that we must speak definitely, unless we can specify what forestry will do for us in Canada and the United States we may very well consider that we have failed in the presentation of our case.

I like to think of the forest as giving us not merely protection for our water supply, not merely the guarantee of the productiveness of our soils, not merely the assurance of the continuity of desirable local climatic conditions, but also as doing what it actually does—supplying us from day to day with that material which is perhaps on the whole the most important material for the building up of our civilization. We call this an age of steel, and so it is, but it is not the less an age of wood.

We are face to face all over this North American continent, with a coming scarcity, in no long time, of this chief ingredient in construction, the pinch of the lack of which is going to be felt widely and keenly when it comes. We must remember that when this want does come, it will not be a question merely of reopening the source of supply as we reopened the mines when we were threatened with a coal famine a few years ago. It will be a question of facing the want for years. Fifty years is the shortest possible time within which the materials of construction can be grown. This is a matter in which foresight is the prime duty. Signs are not lacking throughout this continent that the approaching timber famine is not far away. I am informed that the prices of pine in Ontario have doubled within the past ten years; and similar facts might be cited from the other timber producing areas of North America.

Let us pass briefly in review some of the ways in which the forest contributes to the national well being. You all know these things; nevertheless it will do no harm for us to keep them freshly in mind, as I think we should do throughout this convention. Though it is true that, in the eastern part of Canada and the United States, the pioneer farmer was obliged to clear away the forest before it was possible for him to build his house or support his family, it is also true that the time of the conquest of fields from the forest is almost wholly past. We have now reached the point where the forest, instead of being the enemy of the farmer in the east, is his most potent friend. And in the west we have reached the point where the farmer without the forest either nearby on his own farms or within the distance of reasonable railroad transportation, absolutely cannot prosecute his industry. We have reached the point where successful agriculture depends directly and immediately on the preservation of our forests. Just across the line, in Michigan, there is a most convincing example of the expense and loss and lack of productiveness produced by the destruction of the forest on non-agricultural lands.

We may assume then, that the fundamental industry of your great country and my great country is absolutely impossible in the absence of forest preservation. The same thing is literally true of mining. It may be contended that when wood is gone as fuel we can burn coal. But it is obvious on a moment's consideration that we cannot get the coal except through the assistance of the forest, because mining is impossible without vast supplies of timber. Even iron, on which the civilization of this age is often said to be based, could not be won from the earth unless the forest gave the means to do it. Nor can iron and steel supply the lack of wood. They replace it for certain uses, but they do not lessen the demands upon the forest. The larger the amount of iron and steel used in construction, the more iron and steel replace wood in steamboats, railroad cars and buildings, so much the more building is there, and so much the larger is the total quantity of wood used in constructions of these kinds. The increase in the total consumption of wood keeps pace with the increase in the use of substitutes.

We cannot build railroads nor maintain them without the forest. We figure that if a tree were growing at each end of every railroad tie in every railroad in the United States, we should be able barely to keep these ties sound in the track. The estimate makes no allowance for any increase in mileage, which increase is going on so rapidly. The annual consumption of ties on steam and electric railroads in the United States closely approaches 150,000,000 per annum. It is an enormous sum, the contribution of the forest to transportation; without it transportation would be impossible.

The average citizen depends in his daily life at every point on the timber supply. And I repeat it, for it stands to me in a vital place in the consideration of this whole matter, that wood is just as necessary to us in this day as a material basis for our civilization as any other material. If we are to preserve our prosperity, if we are to grow—and growth is the one thing that every citizen of Canada and of the United States looks forward to for his country—we must preserve our forests. That stands in the first place.

With your permission I will say a word concerning the fundamental ideas upon which the forest service of the United States is doing its work. The first of these is that the permanent safety of the forests in any country with political institutions such as those of the English-speaking race, must be based upon education. We are making our most fundamental effort in the direction of having every man, woman and child in the United States understand that forestry means something to every home, that this is not an academic question, but a matter that appeals directly to every man, woman and child living in North America to-day. This is the basis. We are going to see to it—and this may be called a prophecy merely—that every school child, every boy and girl who passes from the primary into the high school, and from the high school to the college, shall know what forestry means; that in every university something shall be taught of forestry as a branch of general culture, not as a profession, but as one of the things that every educated man ought to know about. In this domain of educational example we are trying to establish object lessons in forestry by co-operation with private owners, because the great body of our forests is in the hands of private owners. We hope by these object lessons to show to every man who cares to see, that forestry is practical, that it is not merely a theory but that it may be carried out in the forest at a profit. And in this we have been so successful that the great

organization of lumbermen in the United States, the National Lumber Manufacturers' Association, has emphasized its belief in practical forestry by appointing a committee to raise an endowment of \$150,000 for a chair of lumbering in the Yale Forest School. It is done, of course, because the lumbermen believe that they themselves will need foresters, and because they must have foresters who have been trained in lumbering.

So much for education. Now as to the use of the public lands and forests. We base our whole policy on a principle stated by the president that every piece of land must be put to its best use, no matter what that may be. It must be put to the use that will make it contribute, in the largest measure, to the general welfare. It follows that every acre of public land which will contribute more to the public welfare by being maintained in forest, should remain in public ownership. Therefore, we set aside, as our first duty, forest reserves wherever there are timbered public lands in the United States.

We have already some 100,000,000 acres of these reserves; an area, unfortunately not one quarter large enough. But we took up this work after the greater part of the best timbered lands in certain regions of the United States had passed into private ownership. You have been wise enough to keep the title in the nation, and your opportunity of making forest reserves is better than ours.

I might cite the instance of the state of New York, in order to point this moral. A former Governor of New York, a Mr. Seymour, who was in office at the time when the forest lands in the Adirondacks had small value and were owned by the state, looked far ahead and suggested that these lands should be reserved as state forests. He was laughed at, and the state parted with its title for a mere pittance. Since that time, the legislative descendants of the men who refused to listen to Governor Seymour have paid many millions of dollars to buy back the lands that might have been kept in public ownership without any expense whatever. And we in the United States must hereafter spend millions upon millions—we may begin with this session of Congress; I hope so—merely to buy back the lands that we ought to have kept, when the keeping of them would have involved no public expense.

Our forest reserves, once set aside, are treated as separate from the rest of the public lands, under different laws and different regulations. In carrying out this policy, the forest reserves have been taken from the management of the General Land Office, which looks after the public lands generally, but mainly with the purpose of disposing of them, and put in charge of the Department of Agriculture, to be used for purposes of production. Every possible resource of these forest reserves is for use, timber, water, grass, mines and every other. Nothing in the forest reserves is exempted from use, but nothing is open to any use that will destroy the permanence of the reserve resources, with the exception of the mines. We shall see to it that these forest reserves continue not only through the years, but through the centuries to make their contribution to the welfare of the country.

Another fundamental idea is that of co-operation. We co-operate in the closest and most cordial way with the men who use the forest reserves. Forestry as a permanent policy can only rest on good will. One man can set more forest fires, if he chooses his time rightly, than ten times the number of men in this room can put out. We see clearly that we can protect our forests only if we have the good will of the

people who live in their neighbourhood; and the Forest Service of the United States is doing its best to secure that good will by treating the people fairly, and by making them pay the market price for whatever they pay for. That does not seem, perhaps, to be the best way to secure good will; but we find that the men who use the reserves have much more respect for the officers who administer them, and for the reserves themselves, if we are successful in doing with the reserves, in certain lines, what any private owner would do with his own property. We see no reason why all the people should receive less from their forest reserves than would be the case if the whole of the profit went to a single man. And we are successful in securing market prices, and I venture to think, in conciliating the people. A few years ago, there was almost universal opposition to the forest reserves in the west. To-day organized opposition has disappeared, and I believe that the policy which once would have been unanimously disapproved would now be almost unanimously supported, if it could be put to the vote of the people in the regions where our forest reserves lie.

One word more: The Forest Service is making a vigorous attempt to have the reserves handled from the point of view of technical forestry. We regard forestry as a profession, like engineering, law or medicine, and we are doing our best to see to it that the men who carry on the work of the forest reserves shall be men trained to the service—professionally trained men with a technical equipment which will entitle them to recognition on the same plane as highly trained members of other professions. Resting on the foundation of this body of trained men, whose profession is forestry, and who propose to give their lives to it, we are trying to build up a force that shall have esprit de corps, permanence, and the quality that comes from continual sifting, until in the end it becomes the very best collection of men anywhere in the government service. For it is one thing about forestry that you can get a better man to work for less money in the woods than at any other piece of work I know of.

I have run over this large matter very briefly and rapidly, and I have just one word to say in conclusion: Forestry with us is a business proposition. We do not love the trees any the less because we do not talk about our love for them. But the owners of forest land, in the mass, will never protect their forests for merely sentimental reasons. It has been tried and it has failed. If, however, you can show these owners that it is worth their while to practise forestry, that forest lands can be cut over, under the methods suggested, by a true system of forestry, at a profit now and with a profit to follow, then you can convince them that forestry is business and therefore worthy of their attention.

Finally, the end and aim of all this work is a very definite one. I have said a hundred times that I have no interest in a forest that is not of use. If our forests are to stand unused there, if all we get out of them is the knowledge that we have them, then, so far as I am concerned, they disappear from my field of interest. I care nothing about them whatever. But use is the end of forest preservation, and the highest use. The great object of this whole movement, as the President has repeatedly said, is the making and the maintenance of prosperous homes. Our forest reserves are part of the great equipment of our country for the good of its citizens; and just so far as we use these forests to promote family life, to produce prosperity for the nation, to make and maintain prosperous homes, just so far shall we think ourselves successful.

AFTERNOON SESSION.

WEDNESDAY, January 10, 1906.

FORESTRY ON DOMINION LANDS.

E. STEWART, Dominion Superintendent of Forestry.

If I know anything of the object of the convener of this great convention in calling you together it was to obtain the views of the people from all parts of the Dominion in order that good practical results might follow your deliberations. If we only meet and indulge in a pleasant academical discussion without expressing some opinion of what should be done in a practical way not only to preserve but to propagate our great forests this meeting will fall far short of its opportunities. The fact is, the matters inviting our attention in this connection are far more than academical; they are live issues that demand of the people of the country immediate action, and in the few minutes at my disposal I will ask your attention, first, to the extent of the forests under Dominion control; second, to what we are doing at present regarding them; third, to what in my opinion should be done; and fourth, make but a very brief reference to afforestation on the plains.

When our north-western possessions are mentioned the picture generally suggested is that of vast prairies stretching for hundreds of miles on every hand unrelieved by a single tree. Now while this is true of a very large extent of country it represents only a small part of the total land area owned and controlled by the federal government.

According to the census returns for 1891 the total land area under the control of the Dominion government is 2,656,200 square miles. Of this the bare prairie probably occupies 160,000,000 acres or 250,000 square miles. The barren lands of the far north I have elsewhere estimated at four times that of the prairie or 640,000,000 acres or 1,000,000 square miles. These two would make 1,250,000 square miles of treeless land, and subtracting this from the total land area under federal control will give us 1,406,200 square miles, which is more or less wooded. The total land area owned by the provinces aggregates only 963,618 square miles, so that the Dominion timbered land according to the estimate exceeds the total land area both timbered and cleared up of all the old provinces by 442,582 square miles.

But it may be truly said that on a very large proportion of this the forest growth is of little value for commercial purposes. Let us make due allowance for this and estimate that only one-fifth of this land contains timber fit for such purposes. One-fifth of 1,406,200 gives 281,240 square miles.

We have now taken from the total land areas under Dominion control the barren lands of the far north and the prairie land and then taken only one-fifth of the remainder in our estimate to represent the area of land containing merchantable timber; and we have still left 281,240 square miles. Suppose that the latter area contains only 2,000 feet board measure to the acre, or 1,280,000 feet to the square mile over ten inches at the stump, and we have left after all these reductions 359,987,200,000 feet of mature timber which at the low rate of royalty to the government of \$1 per thousand would be \$359,987,200, which sum represents but a small part of its value to the community and does not include the smaller growing timber which should be regarded as the agriculturist does his growing crop. It is true that much of this timber is not at present available, but it is a portion of the nation's inheritance, and the government as trustees of the state are in duty bound to conserve it whether it is used by those now living or reserved for future generations.

This vast area represents Canada's wood lot. Let us save it while we may. The greater part of the timber is growing on land unsuited for agriculture either from its

high altitude or high latitude. We have in that great region, which is well described as our subarctic forest belt, a vast tract of such land. The spruce tree abounds everywhere, and as it is the most desirable of all varieties for pulp it is even now being looked after for that purpose. This region too is the home of a great variety of the most valuable of the fur-bearing animals whose existence is dependent on the preservation of the forest. Within it are many great lakes and rivers which, owing to the cool temperature of the water, contain fish of the finest quality.

We have also in those wilds, owing to the rough character of the country, rapids and waterfalls innumerable, which will furnish sufficient power for all purposes at little expense. Of its mineral wealth it is too early to speak, but the example of the Yukon teaches us that the explorer need not confine himself to the lower latitudes, and as timber is one of the great requisites for mining, the forest is necessary to its success.

But here too, important as the forest is for the purposes I have named, it is even more so for its influences in various ways. Time will not permit me to notice at any length, perhaps the most important of all reasons for immediate attention to our forestry problem, and that is the necessity that the country at the sources of our water supply should be kept in forest. Denude, for instance, the eastern slope of the Rocky mountains of its forest growth, and as sure as result follows cause you will destroy the great rivers that have their source there. You will create a raging torrent for a few weeks in the spring, and after that a water famine. You will destroy the North and South Saskatchewan, the Athabaska, and the Peace rivers, and you will make a desert of our new western provinces. Your irrigation canals in Alberta will be raging torrents for a short time, and devoid of water when it is required. You will simply bring about a condition of affairs which any one can see to-day in southern Europe, in northern Africa, and in Asia Minor, where large areas of country once fertile are now, owing to the denudation of the timber on the mountain side, practically a desert.

But let us look nearer home. The future of this city of Ottawa as an industrial centre depends on the valuable water-powers of the Ottawa and Gatineau so near at hand, but unless precautions are early taken to preserve the forest at the head waters of these streams we will have raging floods for a short time in the spring, followed by great scarcity of water later on, which will render the power so unstable as to be practically worthless.

Again, to say nothing of the evil effects on the fertile lands farther south that would follow the destruction of the forests lying north of the provinces which at present form a barrier against the northern air currents, the severe winter of those high northern latitudes would be made almost intolerable by the arctic winds that would then blow uninterruptedly over the denuded land. The fact is that voices come to us from all quarters calling us to protect our timber areas.

What are we doing?

I shall in a few words try to answer this question so far as the Dominion lands are concerned, but it must be admitted that our efforts are small indeed compared with what should be done, but nevertheless sufficient to show remarkable results. Fires are the great enemy of our natural forest, and these usually accompany the early opening up of the country. The building of railways, the use of fire in clearing the land by settlers, and the camp fires of travellers are among the agencies that have caused great destruction of timber in the past. Lightning has also contributed, but in a much smaller degree. The latter is uncontrollable, but the destruction from the other causes may be greatly lessened by due precautions, and the enforcement of regulations. Not only during the construction of railways through the timber are great precautions necessary, but after the roads are in operation the sparks from the engines are liable to start disastrous fires. This latter is a question that I will not pursue further, but it is worthy of further attention at this meeting.

In 1901 a system of forest patrol and guardianship on Dominion lands was started which has been somewhat extended since. I cannot give details of the system; suffice it to say that rangers are assigned certain territory where it is deemed their work is most required. Each of these men is under the supervision of some one in the dis-

trict, usually the head forest ranger, Crown Timber agent, or some one known to the department. It is the duty of this supervising officer to instruct the ranger when to start work and when to quit, and to certify to his time of service before his account is paid. In case of a dangerous fire starting which requires more men to control it, the ranger has authority to engage such men for that particular purpose.

During the past season we had about forty regular rangers employed, principally in the railway belt in British Columbia, along the foothills of the Rocky mountains, along the North Saskatchewan river and country north of that river, along the Athabaska, and in the wooded districts of Manitoba and Saskatchewan.

As to the result of such a service the railway belt in British Columbia furnishes the best example. Prior to the adoption of the fire service five years ago there was annual destruction of large quantities of merchantable timber, while during the past five years practically none has been lost, notwithstanding that they have had a succession of very dry summers, and outside of this railway belt hundreds of millions of feet of magnificent timber have been destroyed.

No better investment of public funds can be conceived of than in this protective service. What town or city would be guilty of such folly as to refuse to afford some system of protection against fire for its buildings, and why should the nation fail to take similar precautions to protect its own forest property? The buildings in a town or city can be replaced in a year, while a century or more would be required for the restoration of a forest.

Within the past year the forestry branch has started making a careful examination of the forest reserves, and it is the intention to continue this work till we have a complete knowledge of the timber on them, the quantity, varieties and quality, rate of growth, &c., with a view of removing the dead and down timber and harvesting the full grown crop and fostering a permanent reproduction. It is also hoped to be able to employ expert men in the examination of other timber areas in order to obtain information as to what areas it is desirable to further set aside as reserves.

One difficulty in our work is to know what we have. We know practically nothing of our timber and other natural resources extending over a large proportion of our possessions. In the early history of Canada the pioneer was very much in evidence, but when the people settled down to sedentary occupations the spirit of adventure seemed to die out, so that to-day we know no more, perhaps less, of our unoccupied wilderness than did the voyageur of two hundred years ago.

Exploration in advance of settlement is a necessity. With the knowledge that this would furnish us, we would be able to assign such districts to agriculture as would be best suited for that purpose, and to leave in forest land not adapted for agriculture but suited for the growth of timber.

Canada is practically the only country in the northern hemisphere to which the eyes of the world are turned for a timber supply in the time of great scarcity, which is fast overtaking us. Let us at once take means to preserve what we have for this contingency. Let us remember not only our present supply, but that we are dealing with that kingdom of nature where the life forces are at work, and where reproduction and growth may immensely prolong the supply if nature is not prejudicially interfered with.

The attention that has hitherto been given to the forest in this country has been in cutting it down, either for the value of the timber or to get rid of it, in order that the land might be more profitably employed for agriculture; but the day has now arrived when we should cease to regard our productive forests as mines from which only a fixed amount of wealth can be obtained and then abandoned. We should recognize the fact of continuous growth and reproduction of the same varieties, crop succeeding crop for indefinite periods of time. To be sure, it takes about one hundred years for the growth of a mature timber crop, but it requires no labour on our part, and it asks only that we allow nature without interruption to do its part and generally too on land useless for other purposes.

Owing to the long period required for the production of a mature timber crop, the individual cannot be expected to take the same interest in it that he does in

agricultural crops that mature in one year, and for this reason forestry belongs more to the state whose life is not measured by years, but by centuries. There is another reason why forestry in this country belongs more exclusively to the state than in perhaps any other country in the world, and it is owing to the fact that most of the land on which our valuable timber grows is still held by the Crown; and considering that the nation is the owner it is most appropriate that this meeting is called in order that the government may have the views of those competent to give advice on a matter that they are called to administer.

Most of the countries of Europe make the administration of their forests one of their most important departments of government. India through the efforts of Sir Dietrich Brandis now possesses a forestry service which is not only producing excellent financial results but is also working on lines that are greatly benefiting the country in conserving its water supply that was rapidly becoming exhausted. The United States within the past five years has awakened to the necessity of action and is now wisely expending large sums in the service, and there is no reason why Canada with the timber wealth it possesses and with the advantages of government ownership to which I have referred should not take a leading place among the nations of the world in its forestry management, and this convention which might be called a forestry parliament can do very much by resolution or otherwise to further this desirable end.

In this connection there is just one more point that I would like to submit for your consideration. It is one that I have had in mind for some time and which I am fully persuaded could be adopted without difficulty and would be greatly in the public interest. It is this, that in all future patents of timbered land, a proviso should be inserted that at least ten per cent of the area conveyed should be left in timber; that the timber growing thereon should be the property of the patentee but only to be cut under the authority and supervision of the government. I believe such a reservation was made in some of the seigniorial conveyances in Lower Canada, and the old Upper Canada Land Company, if I am not mistaken, made a similar provision in some of their deeds.

I have little time left to say anything on tree planting on the plains which the Forestry Branch of the Department of the Interior has started there in co-operation with the settlers, and it is unnecessary that I should do so as Mr. Ross, the assistant superintendent, will present a paper dealing with that branch of our work. It is sufficient to say that when we have sent out in the spring the nursery stock now ready for shipment we will have distributed in all about 7,000,000 trees free of charge to settlers living on the bare prairie. The system we have adopted is meeting with gratifying success, and it is confidently predicted it will prove of incalculable benefit to the great plains region.

THE ALARMING DESTRUCTION OF OUR FORESTS BY FIRE.

Dr. Robert Bell, Acting Director of the Geological Survey of Canada.

The title of my paper, as given in the programme is 'Forest Fires.' I intend, however, to specialize somewhat, and to show the alarming destruction of our forests by fires. I may take advantage of the map (here exhibited) prepared for Mr. Stewart's paper to make a few preliminary remarks upon the extent of the northern forests of Canada. The area of these forests is accurately indicated by the lines placed upon the map by Mr. Stewart. This southernmost line represents the division between what may be called the southern and the northern forests. The area between this line and the one next to the north is, perhaps, the greatest, or at least, one of the greatest northern forests in the world. I suppose it is safe to say that it cannot be exceeded anywhere except possibly in Siberia. This area is a tract over 3,000—perhaps nearly 4,000 miles in length by from 500 to 800 miles in general breadth, and occupies, as

you will see by the map, a great part of the Dominion. We have in the inter-lake region, the more southern forest, presenting the greatest variety of species of trees in Canada. In our forests, east of the Rocky mountains, we have between ninety and one hundred species of trees, most of which grow in Ontario and Quebec. Here the coniferous trees, including the white and red pine, are all represented. Not long ago it was supposed that these pines extended indefinitely to the north. But my investigation soon showed that white and red pine are comparatively southern trees and do not extend north of the line representing their range on my published map.

The forest fires to which I wish to refer are confined to the great northern area. I have here also a map showing this in greater detail. I may explain that this northern forest is subject to fire in a special degree, because the trees stand close together and many have branches down to the ground; so that, when a fire is raging, its fuel is close enough together to make a solid mass of flame. When one of these fires starts, it sweeps on with remarkable velocity, and, in the course of a day or two may destroy ten million acres of forest. In July and August there is little rain in this region, and the trees become exceedingly dry. On a hot day, you can smell the turpentine given off in the form of hydro-carbon gas everywhere, so much so that an experienced man will not light a match among these trees. If a light is applied to one of these trees it will go off like gun-powder. The flames leap up a hundred feet in the air, and will shoot forward hundreds of yards in advance of the forest fire itself. That is because the air itself may be said to be on fire. You see in the air, long tongues of flame, owing to the existence in the atmosphere of the hydro-carbon gas given out by the trees owing to the heat of the sun, greatly increased by the influence of the heat of the fire. In this way, the fire crosses rivers and lakes and goes on burning everything in the countryside. We know that there have been great forest fires in the northern country; but, up to this time, I do not think that any one but those who have travelled very extensively in that country has any idea of how great destruction these fires have caused. I commenced my travels in these immense northern forests forty years ago, and, ever since that time I have made careful notes of the burned areas. For the last five years, the officers of the Geological Survey generally have been adding to this work, so that now I am able to map out these areas and to give the dates of the burning. I have here a copy of the map so prepared. The lines are laid down fairly accurately, because we have, in a hundred note books or more, the details showing these areas. I regard this as a very important work at this time. In fact, I do not know of any other subject of greater importance to the government than this matter of the alarming destruction of our forests by fire and the means to be taken to prevent a continuance of that destruction. Of course, we cannot hope wholly to prevent the occurrence of fires, but we can do much to prevent them spreading.

I found that while travellers, especially white men, are responsible for a considerable proportion of these fires, the greater number are not due to human agency at all, but to lightning. This, probably, has gone on not only since the first explorers came to the country, but from time immemorial, for tens of thousands of years. As a result, if you go into any part of the northern forest and stand upon a high hill, the whole country appears to your eye as a patchwork of different colours according to the age of the different parts of the forest. After a fire the first growth is of the deciduous trees, such as poplar and birch. These, especially in their early growth, have a light green colour, in contrast with which the patches of coniferous trees look almost black. By the time the coniferous trees have reached maturity the others have died out. The poplars, especially, are short-lived trees. White birches may live to the age of a hundred years or more. While these and the conifers are growing together, we have the light green mixed with the dark shades. Sometimes the forest fire will run across an area of mature forests, and continue through another area upon which the trees are of comparatively recent growth. Thus, the effort of nature to re-clothe the ground with forest is found in all stages of advancement. Now, according to my observations, a white spruce tree attains its maturity in something less than 150 years. I have seldom found specimens in which the rings of annual growth show a greater age. No doubt, the tree will grow for a longer time than that. But

the forests of that region have been so often overrun by fires of greater or less extent that we cannot say with certainty that there is any fully grown forest in that country. I have attempted to represent the existing conditions on this map by the different colours. I have classified the different areas according to periods of thirty years by using different shades of green, brown and yellow.

I have said that the greater part of these fires is caused by lightning. Any one who has lived at a Hudson's Bay Company's post in that country, or any Indian resident will tell you that he has witnessed the starting of these fires. I myself, on several occasions, have seen, in the short time between the play of the lightning and the downfall of heavy rain, a tree struck and a fire started. When the tree is struck the moss or the reindeer lichens are set fire to, and these burn with as great rapidity as the trees themselves. You may have seen it stated that fire will run in these reindeer lichens as fast as a man can run. The fires started by human agency are fewer than those by lightning. Those that occur in this way are often due to the facilities for producing fire which every one enjoys these days. Lucifer matches have much to answer for. It is easy now for a man to make a smudge at any time. If he had to strike fire with flint and steel, as in the old days, he would not make so many smudges. White men have shown criminal carelessness in camping in the woods and making fires on the moss. And, I am sorry to say, the Indians are following this bad example. Formerly the Indians were very careful not to set fire to the forest, because to do so meant the destruction of their hunting-ground. But now, everything seems to be owned in common and so the Indians are following the example of criminal negligence set them by members of the white race. But, as I have said, lightning is the great cause of fire among these forests. In our cleared country, in the summer, we hear almost every day of barns and haystacks being set afire by lightning. That being the case here, how much more likely are fires to be started by the same cause in this inflammable country to the north. I have more than once seen several fires burning at the same time, where not an Indian was within a hundred miles of them. We have evidence that this burning of the forest has gone on in former times in the deep pits of charcoal that are dug up at various depths. But we have a curious and even more conclusive proof in the habit of one of the trees of the northern regions. The banksian pine has developed the peculiar habit of requiring fire to liberate the seed. Without fire this tree is not propagated except in limited cases. This is an evidence among others, that these fires have gone on from time immemorial. It may be said that, this being the case, we cannot prevent the starting of forest fires. We may, however, prevent their spreading by following the course that Mr. Stewart has pointed out, namely by increasing our force of foresters. We can also do much by giving the Indians rewards for putting out fires, thus encouraging them to protect their own interests. I have long made it a point, when stopping at any Hudson's Bay post, or when meeting the Indians elsewhere, to make a speech urging them to protect the forest. It has sometimes been a revelation to them to hear that the white man valued green timber. They have told me 'we are doing you a service by scorching the trees and making plenty of dry wood for your camps.' I think we should discourage the starting of fires by Indians by some means such as withholding treaty money from those who wilfully set fire to a forest. On the other hand they might be rewarded for putting out fires. They sometimes do that in any case. A good Indian, when he finds a fire burning will endeavour to put it out. Many a time I have stopped my party for hours or even for a whole day to put out fires which I found burning during the dry season.

To give an idea of the extent of these fires, I may say that they sometimes cover tens of millions of acres, and the evidence we have shows that the forests which have been burned in recent times represented the value of hundreds, if not thousands of millions of dollars. Surely, it is most important for the government to take any reason. He means to prevent this destruction and loss. What we need to do is to give the forest a chance to grow. This is much more important than planting seeds. The seeds plant themselves and the trees will be there in time if you give them a chance to



IN THE ROCKY MOUNTAINS.

grow. If we can prevent the spread of these frequent forest fires, we shall perform an important duty and shall add immensely to the value of our country.

EFFECT OF THE CONSERVATION OF THE FORESTS OF CANADA ON THE WATER POWERS OF THE COUNTRY.

C. H. KEEFER, C.E.

Representing the Canadian Society of Civil Engineers.

We have in Canada a most magnificent heritage in our water powers, and anything which tends to their preservation and the regulation of the flow of our rivers may well become an object of national importance.

REGULATION OF FLOW.

To utilize our water powers to the best possible advantage, to obviate the loss and destruction of property, and sometimes even of life, caused by floods as well as the consequent waste of water and ultimate loss of power, regulation of the flow is of the utmost importance.

There are two means to attain this end, one is by the storage of water in the natural reservoirs formed by the lakes with which the drainage area of our rivers are generally so liberally provided, controlled by means of dams at the outlets, and this is no doubt desirable and in cases where the forests have been largely removed necessary. The other means is to conserve our forests, and gain the beneficent effect of nature's check on the too rapid discharge of the rivers.

EFFECT OF FLOODS.

To illustrate the result of want of regulation of streams one or two examples of the loss caused by the effect of floods may be of interest. In the United States there was a loss from official estimates for twelve months ending in 1902 of over eighteen million dollars caused by floods in streams which head in the Southern Appalachian mountains and within the northern pine forest, extending from Western Minnesota, east to the Atlantic ocean, and southward to Middle Tennessee, Northern Georgia, Central Virginia and Northern Maryland. The United States Congress has been asked to take control of these floods by the purchase of lands for a Southern Appalachian Forest Reserve. Dr. Fernow in his 'Economics of Forestry' states, 'that the unusual floods on the Prussian rivers, especially the Oder during the last decade; which occasioned over \$2,500,000 damage led to the appointment of a commission—just as this year in the state of New York—to propose remedies. In the two reports made in 1896 and 1898 the influence of forest cover in retardation of snow melting, and the forest flow on retardation of run off, are admitted, but forest conditions are found fairly satisfactory.' New legislation is proposed to supervise private forest management and preserve existing conditions. He also writes that, 'in the first quarter of the century as a consequence of reckless denudation in the Alps, Cevennes and Pyrenees, communities became impoverished by the torrents which destroyed and silted over the fertile lands at the foot of the mountains. Some 8,000,000 acres of once fertile soil, in twenty departments, were involved in these disastrous consequences of forest destruction on over 1,000,000 acres of mountain slopes.' We have had floods in Canada, and there have been many in the United States which have involved large and serious losses. In many cases I believe the cause might properly be assigned to the denudation of the forests.

EFFECT OF CONSERVATION OF FORESTS.

The effect of conservation of forests, is on the flow or volume of the stream and of course through it, on the water power derived from that flow, as the power varies

directly in proportion to the flow. The effect of forests on the flow of streams is more pronounced in mountainous regions where the steeper slopes of the surface increase the rapidity of the run-off more than on more nearly level areas, though in both cases the effect is decided and beneficial in checking too rapid run-off.

The effect of the forest on the run-off or flow of rainfall to the streams is as follows :—

To check and diminish evaporation both by the action of the sun and from the effects of winds or movement of the atmosphere both horizontal and vertical, the effect of this movement is shown by the rapidity with which the roads unsheltered by trees dry up during the prevalence of winds. Dalton says that strong winds doubled the result found in a still atmosphere. Vaporization from snow and ice and water goes on at all temperatures, and is accelerated by wind from four to ten fold as experiments show, according to circumstances, whatever the temperature may be. Forests roughen and break up the ground through which the roots force a passage, so that water can penetrate it, innumerable depressions and sinks being formed to retain the water and prevent its too sudden removal.

FORESTS ON MOUNTAINS.

Forests on mountains cover the ground beneath them with masses of vegetable matter, which hold water like a sponge and favour uniformity of flow in connected rivers. It has been estimated that one square mile of moss cover will hold 14,000,000 to 20,000,000 cubic feet of water.

Evaporation.—In connection with the very important influence of the forest on evaporation, the following table from Bulletin No. 7 of the Forestry Division of the United States Department of Agriculture is of interest. The influences controlling evaporation being the temperature, the wind and the amount of vapour already present in the air, the first two of these being much changed by the influence of the forest.

The following table of evaporation in woods, in per cent of evaporation in the open, gives results of experiments made by Dr. Ebermayer and German results, which show that evaporation, as compared with evaporation from water surface from April to October, was in the open about 93 per cent, and in the woods 35 per cent, and under forest and forest litter 13 per cent.

In the German evaporation in the woods was 39 per cent of that from a water surface in the open.

EVAPORATION IN WOODS IN PER CENT OF EVAPORATION IN THE OPEN.

DR. EBERMAYER'S RESULTS.						GERMAN OBSERVATIONS.		
Water Surface Bare Soil.			Soil under forest litter and within forest.	Rainfall.	Water Surface Rainfall.			
Open Woods.					Open Woods.			
April 1.....	·45	1·15	·64	·27	1·75	1	·51	1·37
May 1.....	·43	·91	·37	·16	·68	1	·47	1·35
June 1.....	·36	1·07	·38	·14	1·46	1	·41	1·91
July 1.....	·35	·89	·34	·12	1·02	1	·38	2·33
August 1....	·34	·87	·36	·11	1·00	1	·36	1·98
September 1.	·33	·92	·36	·11	·59	1	·35	2·54
October 1....	·41	1·26	·44	·18	3·45	1	·37	8·40
May-Sept. ...	1·36	·93	·35	·13	·95	1	·39	2·02

This table brings to light several interesting facts shown by the experiments, the most striking being the effect of forest litter on evaporation, where in August and

September it was only 11 per cent of evaporation from water in the open. This table gives results of experiments in spring, summer and fall months and the annual evaporation in forests is computed as being 44 per cent of that in the fields.

The importance of the forests to water supply in retaining 44 per cent of the rainfall which would otherwise be dissipated in vapour, can readily be seen, as it means a large addition to the amount which eventually reaches the streams, and is converted into water power.

DATA AS TO EFFECT.

Unfortunately, in Canada we have not yet established a system of official measurements, and results of stream flow, which would be of great value for other purposes, and there is a want of information systematically obtained, and extending over a period of years on which conclusions could be based as to the effect that has taken place on our water supplies by deforestation.

THE GRAND RIVER.

Mr. W. H. Breithaupt, a member of the Canadian Society of Civil Engineers, in a paper read before the society, on the 'Grand River, Ontario Peninsula,' states that the drainage area of the Grand river in its original condition about up to the year 1800 was densely wooded or was covered with swamps, some little clearing having been done. From about 1800 settlement extended as far as Waterloo County, which by 1820 was mostly taken up. From about 1805 settlement extended farther up, but the head waters of the river remained practically intact until 1870. As recently as 1871, the township of Luther is described as nearly wholly consisting of impenetrable swamp. The adjoining townships were largely swamps, and partly hardwood forests. In the following years drainage of these townships and the general clearing off of the forests became rapid. Up to the year 1860 the flow of the river was fairly regular with a good body of water throughout the summer, and as a rule no great floods in the spring except when influenced locally by the formation of ice gorges. The minimum flow seems to have decreased, more particularly since 1875, coincident with the drainage and clearing of the head townships. From fairly definite evidence at points in Waterloo township, the decrease in the past fifteen years appears to be fully 40 per cent of the minimum in 1890. On the Ottawa river the flood waters reach Ottawa about two weeks earlier than they did years ago, due no doubt to the drainage and clearing of the lower sections of the drainage area. The north waters being more largely protected by forest cover, and controlled above Lake Temiskaming by lumbermen's dams, reaching Ottawa at a later date. On a creek or tributary of the Madawaska river, I am informed, that years ago a small saw mill was running for three months in the year, now the creek is practically dried up by the removal by fire of the forest adjoining it.

STATISTICS IN THE UNITED STATES.

In the United States the importance of the effect of forest protection on water supplies is fully realized and though not much definite information is available, measurements and data are being obtained. Dr. Fernow in 'Economics of Forestry' quotes a calculation that the influence of the forest is equal to five or six inches of rain fall. This amount is probably nearly twenty-five per cent of the average annual precipitation of rainfall in Canada. This indicates the importance of forest protection to the millions of horse power we have available in Canada. Mr. B. W. DeCourcey, M. Am. Soc. C.E., writing in the transactions of the society, states of part of Washington territory: 'This entire region is covered with a dense growth of timber consisting of the Douglas fir, spruce, cedar and *tsuga mertensiana* (commonly called hemlock though quite a different timber from the hemlock of Canada and the east) besides there is a dense growth underneath of sallow, open vine maple and small woods so

completely impervious to wind and the solar rays that there is scarcely any evaporation, and this and the fallen timber hold back the rainfall from the streams and deliver it so gradually that pronounced freshets are quite uncommon in the large or comparatively large streams.'

From the papers published by the United States Geological Survey the following extract is made showing the effect of forest preservation on mountain streams :—

'The denser the vegetable growth and the thicker the soil cover on the mountain slopes the more effective this direct storage of the winter rains and the more uniform the stream flow during the summer months. These facts are brought out by some measurements made by the Bureau of Forestry in the San Bernardino mountains in 1899, and published in a paper by J. W. Toumey, entitled 'The Relation of Forests to Stream Flow' the following extract contains the essence of the paper.

'In a careful study of the behaviour of the stream flow in several small catchment areas on the San Bernardino mountains it has been found that the effect of the forest in decreasing surface flow on small catchment basins is enormous as shown in the following tables, where three well timbered areas are compared with a more timbered one;

The following tables of precipitation and run-off, show the run-off during December, 1899, was from 36— to 70— in forested areas, and 312— in non-forested areas.

PRECIPITATION AND RUN-OFF DURING DECEMBER, 1899.

Condition as to cover.	Area of catchment basin.	Precipitation.	Run-off per sq. mile.	Run-off in percentage of precipitation.
	Sq. miles.	Inches.	Acre feet.	Per cent.
Forested	0.70	+19	— 36	3
"	1.05	+19	+ 73	6
"	1.47	+19	— 70	6
Non-forested	0.53	—13	+312	40

At the beginning of this rainy season in early December the soil on all four of these basins was very dry as a result of the long dry season. The accumulation of litter, duff, humus, and soil in the forest covered catchment areas absorbed 95 per cent of the unusually large precipitation; on the non-forested area only 60 per cent of the precipitation was absorbed although the rainfall was much less.

In January, February and March, 1900, the run off was from 428 to 557 acre feet per square mile on forested areas and 828 on non-forested areas, and the percentage of run-off to precipitation was from 33 to 43 per cent on forested areas, and 95 per cent on non-forested areas.

RAINFALL AND RUN-OFF DURING JANUARY, FEBRUARY AND MARCH, 1900.

Condition as to cover.	Area of catchment basin.	Precipitation.	Run-off per sq. mile.	Run-off in percentage of precipitation
	Sq. miles.	Inches.	Acre feet.	Per cent.
Forested	0.70	24	+452	35
"	1.05	24	+428	33
"	1.47	23	+557	43
Non-forested	0.53	16	+828	95

The most striking feature of this table as compared with the previous one, is the uniformly large run-off as compared with the rainfall. This clearly shows the enormous amount of water taken up by dry soil, either forested or non-forested, as compared to one already nearly filled to saturation. During the three months here noted on the forested basins about three-eighths of the rainfall appeared in the run-off, while on the non-forested area nineteen-twentieths appeared on the run-off.

The rapidity of decrease in run-off, after the close of the rainy season, was for April, May and June, from 153 acre feet per square mile, to 30 acre feet per square mile in forested areas, and from 56 to 0, on non-forested areas.

RAPIDITY OF DECREASE IN RUN-OFF AFTER THE CLOSE OF THE RAINY SEASON.

Condition as to cover.	Area of catchment basin.	Precipitation.	April run-off per sq. mile.	May run-off per sq. mile.	June run-off per sq. mile.
	Sq. miles.	Inches.	Acre feet.	Acre feet.	Acre feet.
Forested.....	0.70	1.6	-153	-66	25
".....	1.95	1.6	-146	-70	30
".....	1.47	1.6	+166	-74	30
Non-forested.....	0.53	1.	+ 56	- 2	0

The above table clearly shows the importance of the forest in sustaining the flow of mountain streams. The three forested catchment areas, which during December experienced a run-off of but five per cent of the heavy precipitation for that month, and which during January, February and March of the following year had a run-off of approximately thirty-seven per cent of the total precipitation, experienced a well sustained stream flow three months after the close of the rainy season. The non-forested catchment areas, which during December experienced a run off of forty per cent of the rainfall and which during the three following months had a run-off of ninety per cent of the precipitation, experienced a run-off in April (per square mile) of less than one-third of the forested catchment areas, and in June the flow from the non-forested area had ceased altogether.

These facts are of wide application to Canada as proportionately the same effects are produced, and emphasize the importance of forest protection to our water supply. We are blest in Canada with a more or less heavy winter covering of snow, and this where protected by forest, is a very important factor in our water supply. The effect of forests on snow covering is, that it will lie in the forests more evenly and continuously than in the wind swept areas. The amount remaining for drainage is increased, and soil prevented from freezing and kept open for percolation during melting of the snows. Buhler in Switzerland, has determined the retardation of the melting due to forest influence to be from eight to fourteen days. In experiments made by R. W. Piper, a body of snow one foot in depth protected from the wind, but partially exposed to the sun, after a thaw of two weeks was not wholly melted, while another mass six feet in depth, more sheltered from the sun was melted in less than a week. The wind sweeping over where the forest cover is removed, drifts the snow hither and thither, and wears it out at the same time. By the blowing of the wind the snow is reduced to finest particles, and, by the shifting new surfaces are constantly exposed to processes which greatly facilitates evaporation, and thus the snow is literally worn out. The necessity for forest protection of water supplies is fully realized in Germany where laws are made to establish and preserve protection forests to prevent floods, sand blowing, land and snow slides, or to insure regularity of water supply. The loss from the removal of forests is an ancient story, Dr. Fernow gives some interesting historical facts as for instance:—

Plato in 'Civitas' writes of the 'sickening of the country' in consequence of deforestation. The Roman 'Twelve Table Laws' the organic law of the republic, recognizes the necessity of forest protection, and Cicero in his second Philippics designates as enemies to the public interest those engaged in forest devastation. Mesopotamia, once praised as the paradise of fertility, where according to Herodotus the culture of the grape could not succeed on account of its moisture, has become a sand waste, in which the Euphrates, once an ample source of water supply, is drowned. Most of the springs and brooks in Palestine and with them the fertility still celebrated in the early middle ages, have gone. In Italy, France and in fact everywhere in more modern times, the effects of deforestation have been felt in loss and damage from floods, and failing water supply.

CONCLUSION.

In conclusion the effect of the conservation of the forests of Canada on the water powers of the country is most beneficial and its importance cannot be over estimated. While the influence of forest cover on precipitation or rainfall, is problematical, there can be no doubt of its direct influence in the regulation of flow, and prevention of extreme floods involving loss, damage, and waste of water power. The water powers of our country are second to none, their importance in view of the developments that have been made in the transmission of electric power is far reaching, and this, with the great saving in cost of electric power over power generated by steam, should, with our enormous natural resources, place Canada in time in the front rank, as a manufacturing and exporting country. Everything that tends to the preservation and improvement of our water powers is of direct and lasting benefit to so great a source of Canada's wealth, which will be constantly increasing in value.

The question of forest preservation is of national importance, and is well worthy of the most careful consideration by our governments. Something has already been done in the establishing of reserves for national parks, and by continuing this good work assisting reforestation, obtaining records of stream flow, and establishing park reserves at the head waters of our large rivers, the governments of the Dominion and provinces would confer a lasting benefit on future generations in Canada.

FOREST RESERVES AND THEIR MANAGEMENT.

THOS. SOUTHWORTH, DIRECTOR OF FORESTRY FOR ONTARIO.

While legislative action in the direction of creating permanent forest reserves is of comparatively recent date in Canada, the idea of reserving certain timbered lands from settlement as a permanent forest estate for the Crown dates back to the earliest occupation of the country.

From very early times reserving some part of the timber wealth of the country for the Crown was had in view by the authorities. True, the government of France never made any reserves of territory, merely of timber. The authorities of the French court apparently were willing to give the land to any of the French gentlemen who would undertake to colonize it, but with the condition that any oak timber found on the land should be reserved for the King for the purposes of the Royal Navy. In nearly all the seigniorial grants this reservation was made, and in some cases pine for masting was also reserved. This reservation was no dead letter for in 1731 permission was given the Sieur Abbe LePage to cut 'in the seigniories of Berthier and Dautray two thousand feet of oak wood following plans and methods which we have caused to be forwarded to serve for the construction of war vessels of 500 tons which the King designs to have constructed in Quebec.'

This reservation of timber on settlers' lands caused a great deal of trouble in those days as in these, and was finally removed by legislation.

Briefly, then, the French administration of the timbered lands in Canada looked to the reservation to the Crown of timber suitable for naval purposes, but without any attempt to restrict the cutting of, or to secure public revenues from, the forest beyond that.

Upon the British occupation of the colonies, very definite instructions were sent from the home government to the first governor, James Murray, in 1763, as to the disposition of the forest wealth of the colony. The British authorities, like the French, seemed to regard the forest as a source of supply for naval purposes, but the British appeared to contemplate a more systematic method of conserving these resources than their predecessors. Governor Murray was instructed to lay out townships of about twenty thousand acres in extent along the River St. Lawrence, and in each township he was to reserve for the Crown, land for military barracks where needed, but 'more particularly for the growth and production of naval timber if there are any woodlands fit for that purpose.' This idea of municipal forest reserves was not then carried out, but has only recently been revived in a recommendation now before the government.

Governor Murray was further advised, as follows:—

'And whereas, it has been further represented to us that a great part of the country in the neighbourhood of Lake Champlain, and between Lake Champlain and the River St. Lawrence abounds with woods producing trees fit for masting for our Royal Navy and other useful and necessary timber for our navy constructions; you are therefore expressly directed and required to cause such parts of the said country, or any other within your government, that shall appear on survey to abound with such trees and shall be convenient for water carriage, to be reserved to us and to use your utmost endeavour to prevent any waste being committed upon the said tracts by punishing in due course of law any persons who shall cut down or destroy any trees growing thereon, and you are to consider and advise with our council whether some regulation that shall prevent any sawmills whatever from being erected within your government without a license from you or the commander in chief of our said provinces, for the time being, may not be a means of preventing all waste and destruction in such tracts of land as shall be reserved for the purposes aforesaid.'

It is perhaps needless to say that the Governor's instructions were never fully carried out, in fact, I believe the survey is not yet altogether completed, and no reservation was definitely made. Further examination of the forest resources of the country removed any fear of a short supply for our Royal Navy, and the matter dropped until recently when the prospect of a scarcity of timber with all that implies, began to force itself upon public attention, and in consequence in late years the wisdom of making provision for the future by permanent Crown forests distinct from other forms of land has become apparent to our legislative authorities, and definite action in that direction has been taken.

It is not my purpose to refer at any length to the forest reserves established by the federal government. To the authorities of the federal government the scarcity of timber in the great Northwest became apparent a number of years ago and the first reserve was, I believe, made in 1886, and as Mr. Stewart has already told you, the Dominion reserves at present amount all told to about 6,380,000 acres, exclusive of the Foothills, only partially reserved.

I will also merely mention the initiation of a forest reserve system in Quebec in the creation of the Gaspesian reserve of 2,500 square miles.

I propose to refer more particularly to the forest reserves with which I am personally familiar, those in the province of Ontario, and I believe I am safe in saying that the Ontario reserves are the only ones so far existent created under statutory enactment. The Dominion reserves, I believe, are merely the result of Orders in Council withdrawing from settlement certain areas of land for forest reserves. These can, however, be restored to the other class of lands by another Order in Council. In Ontario, on the other hand, the forest reserves are such under a special Act of the legislature, and when once placed in reserves can only be withdrawn from such by another special Act.

So far as I am aware, the first action towards the establishment of forest reserves in Ontario was occasioned by a memorandum of the writer in October, 1895, addressed to the Hon. A. S. Hardy, then Commissioner of Crown Lands. In this memorandum the attention of the government was directed to the fact that considerable areas of land had been opened for settlement that were quite unsuited for the purpose; that too often settlers found after spending a few years upon the land that they had wasted their time and labour in making a bare existence; while, had these lands been left in timber, they would have been productive of permanent revenue to the Crown and saved the waste of time of the settlers foolish enough to try to convert them into farms.

The memorandum went on to say: 'There yet remain in Ontario still the property of the Crown vast areas of wooded land not taken up by the settler. Some of it is good, some of it poor, and has been or will be cut over by the lumberman. The government might provide for future operations and future revenue, as well as protect the climate and water supply of the region by reserving from settlement throughout the unsettled parts of the province blocks of land that are found to be not well adapted for agricultural purposes, but that are the sources of streams or that for climatic or similar reasons should be kept perpetually in forest.'

Subsequently the government appointed a royal commission to look into this question of forest reservation, composed of John Bertram, E. W. Rathbun, two very prominent lumbermen now both deceased; J. B. McWilliams, superintendent of Forest Rangers; Alexander Kirkwood, of the Crown Lands Department, and myself. This commission strongly endorsed the proposition to separate definitely agricultural from non-agricultural land, and in 1898 the legislature passed an Act to create forest reserves giving the Lieutenant-Governor in Council power to place territory in various parts of the province under the operations of the Act withdrawing it permanently from settlement, and preventing its sale for agricultural or other purposes.

Under the Act, while provision is made for leasing, it is withdrawn from sale, the intention being that it shall remain the permanent estate of the people and not of individuals.

Previous to the passage of this Act, and upon the recommendation of the late Mr. Alexander Kirkwood, for many years a prominent officer of the Department of Crown Lands, the legislature had passed an Act creating the Algonquin National Park, by which this territory, now 1,235,000 acres in extent, was permanently withdrawn from settlement, and made a breeding ground for game in which the killing of all kinds of animals and birds is prohibited. This territory was largely under license to cut timber, and in the creation of the park these licenses were renewed without any regulation as to the cutting, and consequently it can scarcely be classed as a forest reserve.

The first reserve created in Ontario under the new Act was a small one in the eastern part of the province on lands that had long been lumbered and largely burned over, but on which a vigorous crop of young pine was found to be growing. This reserve, created in 1899, comprises in all about 80,000 acres. At the time of its creation it was under license, but arrangement was made with the licensee by which his license terminated at the expiration of five years, and it is now free from any complication.

The following year a small reserve of some 45,000 acres on the north shore of Lake Superior was placed under the operation of the Act. Likewise it was comprised of territory that had been more or less cut over.

Following this there was created a reserve of a different character. This reserve lies in the district of Nipissing and included 2,200 square miles of territory that had never been under license, or on which no timber had been cut. This includes the famous Lake Temagami region, and contains a very large quantity of white pine.

In 1903 a territory immediately west and north-west of this was added, comprising 3,700 square miles, and was called the Western Temagami Reserve.

In the same year 3,000 square miles of territory farther west lying between the main line of the Canadian Pacific railway and the Sault Ste. Marie branch of the

same road, called the Mississauga Reserve was placed under the Act; and in 1905, the reserves were further added to by a reserve surrounding Lake Nipigon covering 7,300 square miles of territory.

So that, aside altogether from Algonquin Park, the forest reserves in Ontario, that is the territory withdrawn from settlement under the provisions of the Forest Reserves Act, amounts to 16,395 square miles, or 10,493,000 acres.

It will be observed that all these larger reserves occur on the plateau or tableland that we usually refer to as the height of land, and that forms the source of the streams flowing both north and south. There is still a great deal of territory of a similar character that will doubtless be added to the reserves in the course of time.

The geographical formation of Ontario is such that the land suitable for forest reserves is located where it ought to be, that is, stretching across the middle of the province from east to west, with a rich agricultural section lying south and north of it. From such information as I have been able to obtain, I believe that an extension of the forest reserves in Ontario to take in the land that should be definitely and permanently withdrawn from agricultural settlement, would comprise a territory of about 40 millions of acres. This territory would be largely contiguous, although in some parts of it there may be found blocks of agricultural lands that will be needed to support the population employed in working the forests.

It must be borne in mind that this whole territory is largely pine bearing country. It contains several billions of feet of pine timber at the present time, although in large areas of the territory the pine has been burnt off and succeeded largely by spruce which is rapidly increasing in value.

In the reserves already created the only step yet taken towards systematic forestry management consists in a system of fire patrol that has proved very effective.

It would be rash to estimate the revenue that could be derived from the present reserves within the next few years if it was needed or desired—\$75,000,000 is a low estimate of the value of the merchantable timber now standing on the present reserves, but as the idea of a forest reserve is to secure perpetual revenue and timber supplies, we will consider this question from the standpoint of the future and without regard to the present crop of mature timber.

Forestry is too young a science in this country to afford us much data upon which to form any estimate of growth under natural forest conditions and nature's reckless methods, while European forestry results are only of comparative value to us. At the same time the splendid work of Mr. Pinchot, Mr. Graves and others in the United States enables us to form somewhat definite conclusions as to the probable annual yield in Ontario forests under natural conditions helped out by the skill of the forester. From figures thus obtained, I am convinced that under proper forestry management the whole of this pine growing territory should produce at least a gross annual revenue of 75 cents per acre. This amount per acre applied to the proposed reserves of 40 million acres would mean a gross revenue from the provincial permanent forests of \$30,000,000 per year.

I am making no estimate as to the length of time required to get this territory into condition to realize this sum, but I am convinced, as stated, that in time, with proper management, this is not an unreasonable revenue to expect. This estimate is based on an annual growth of 150 feet board measure per acre per annum, and with a stumpage value of only \$5 per thousand. At first glance this may appear high, but it must be remembered that this is an estimate of the gross revenue without deducting the cost of management, while in Germany I understand they realize on the Crown forests, much of which is not very productive, a net revenue of \$1.45 per acre and the expense of management in Germany is very high. In Saxony the Crown forests yield about \$4.50 per acre per year net.

As I have stated, in figuring this revenue it is assumed that the permanent forest estate of the province will be placed under systematic forest management, and no country was ever in better condition than the province of Ontario to institute such a system.

In the timber territory outside the reserves which is under license, vested interests are in the way of introducing new methods, but in the reserves proper no licenses are in existence except in the case of part of the Temagami reserve where a concession to cut pulpwood was given to a pulp and paper company previous to the creation of the reserve, which agreement unfortunately did not provide for proper cutting regulations. Aside from this, however, the reserves already created and those likely to be created in the territory referred to are free from any entanglements of this sort.

To achieve this result something more than harvesting the most valuable sorts of trees in the most economical way, as is the present practice of forest exploitation, will be required. That system is converting Algonquin park from a mixed pine and hardwood forest to a hardwood one. Working plans must be laid down covering a hundred years and more, plans that will provide for harvesting the present crop of various sorts of trees in such a manner as to secure the after growth of the right kind of trees and to regulate the cutting so as to secure evenness of supplies and of revenue.

To do this the very highest technical skill will be required, not alone the skill acquired in the lumber camp and the mill, but the knowledge of silviculture, of botany, of forest engineering, &c., only acquired by a scientific training that according to the Ontario Minister of Education is soon to be provided in a Canadian School of Forestry.

The basic principle in the future management of the forest reserves seems to me to lie in keeping in view the idea underlying their creation, the idea of permanency and of operations extending over hundreds of years, not to lose sight of the fact that the forest reserves constitute an important part of the provincial territory distinct from and different to other Crown lands.

MR. M. J. BUTLER,

Deputy Minister of Railways and Canals.

The phase of the discussion which I propose to deal briefly with, is the relation of the locomotive to forest fires, and to show the attitude of the railways towards that question. I will read an article from the 'Railway Gazette' of January 5, 1906, which deals with the matter in this way:

'One of the great risks that every railroad that uses soft coal for fuel runs is the risk of fire to adjacent property started by sparks or ashes from engines. Any man running an engine ought to know from the sparks thrown out and fires started whether the engine is in good or bad order. Rule 946 says that the engine men must report defects in netting and ash pans; this is required so that if the inspector overlooks the defect, or if one occurs between the regular inspections, it will be remedied before any damage is done, and if an engine is throwing more fire than she ought to, it is up to you to report it and get it fixed. It will take you less time than to make a report about the fire and condition of the engine, and, at the same time, save both the owner of the property and the company a loss. In lumber and saw mill country it is especially important that this be done, and where engines are working in or around saw mills, lumber yards, powder and tie plants, and other places where danger of fire is great, the apparatus for preventing the escape of fire should be absolutely perfect, and it ought to be the personal business of the engine man to know that fact; he should be present when the inspection is made, and see that it is done thoroughly, the same as he would if he and not the company had to foot the bill if the engine started a fire.

'On the outlying division, where traffic is light and trains are few, if your engine starts a fire, stop and put it out. If conditions are such that you can't do that with safety, drop a note off to the first section crew or agent, so that they can send men out to extinguish the fire. If you don't, the Lord only knows where it may run to (on the western prairies I have known it to go 25 miles) or how much damage it will do in lumber country.'

That being the principle which the railways themselves desire to see enforced, it will be known therefore that the negligence must be exhibited on the part of the men

who are driving the engine if a fire starts from a locomotive. I took the trouble to call up Mr. Robb, of the Grand Trunk railway. He assures me that since the application of the extension fronts to locomotives there has been a screen placed inside of the extension front of the fire box with a muffle plate. The screen contains holes of less than a quarter of an inch in diameter, so that any spark passing through must be less than a quarter of an inch in diameter and cannot live, as a rule, long enough to fall down and set fire. Their dampers are also screened by a screen having a similar mesh. He further tells me that the Grand Trunk are now using a great many compound engines. The exhaust of a compound engine is a softer one than that of the simple engine which, besides adding to the life of the engine, prevents the issue of sparks.

Mr. Vaughan, Mechanical Superintendent of the Canadian Pacific railway, assures me that the practice of their road is very similar, almost precisely so, and that the inspection of motive power at the present time is very rigid so as to prevent the possibility of forest fires. On the Intercolonial—and these embrace the three great divisions of the railways in Canada—Mr. Joughins, Superintendent of Motive Power, assures me that every engine, as it comes into the roundhouse, receives a careful examination, and it is the duty of the foreman to see that the extension box and the fire box are in perfect order. Notwithstanding the care taken, fires do happen, and no doubt they are due at times to the carelessness of the men on the engines, but in so far as it is possible for the railways to provide against it they do their best to prevent the starting of forest fires.

Mr. JOLY DE LOTBINIÈRE.—Suppose the locomotive engineer is not able, when his locomotive is passing through a forest, to find out whether the sparks which are emitted are going to set fire or not, would it not be an extra precaution on the part of the railway authorities whose lines run through forests, during periods of great drought, to have a well organized body of men placed at different intervals along the line to patrol it carefully?

Mr. BUTLER.—They practically employ that system now. They have their section men scattered along the track, practically a man to a mile, and they go over the road every morning as a part of their duty, ahead of the regular passenger train.

Mr. JOLY DE LOTBINIÈRE.—I do not think that is sufficient because the sectionmen may be employed for four or five hours in one place during dry weather, they have to look after the road bed and do their work, while at the same time engines are constantly passing. I should think that if a regular system of patrol were put in operation during periods of danger the railway companies would be doing real practical work in the way of protecting the adjacent forests. I think that if the railways would look into this matter carefully they probably would adopt these views. It would cost some money, but at the same time it would save them very severe actions in damages.

FOREST PRESERVATION IN CANADA.

MR. AUBREY WHITE,

Deputy Minister of Lands and Mines for the Province of Ontario.

I have been called upon at a moment's notice to speak to you upon the subject of forest preservation and to tell you what we have done in the province of Ontario in respect of that matter. When I had the honour of being appointed to a position in the

Crown Lands Department of Ontario, one of the first questions my minister put to me was: Can you suggest something which will enable us to minimize, if not wipe out altogether, the destruction of the forest wealth of the province by forest fires? I said I would endeavour to formulate some plan, and having had experience in lumbering and a knowledge of the settlement of the back parts of the province, I soon came to definite conclusions. I made up my mind that the only way in which we could expect to protect the timber from destruction by fire was by inculcating care upon the part of those who might be in the forest during the summer months, settlers, hunters, lumbermen, surveyors, &c. I felt there was no use in formulating a plan unless we could follow that up by creating machinery for carrying it into effect and as a step in that direction I suggested that we should select certain men and place them upon the territory under timber license for the purpose of acting as guardians of that territory and doing everything possible to prevent the starting of forest fires, because it is all nonsense to think that after a forest fire has assumed serious proportions it is within the power of man to control it. The great thing to be accomplished was to prevent the fire occurring. The question then came up as to the sort of men who should be selected, who should select them, who should pay them, and what kind of instructions should be given to them. With respect to the selection of men, I said to my minister that if the system was going to be a success, commanding the confidence of everybody, the first thing we had to do was to eliminate the possibility of politics entering into it. I said, if the department selects these men, if the government appoints them, it will immediately be said by some that they are being appointed from the point of view of political patronage and the minister of the day will have arrayed against him one side or other of politics according to whichever party is in power. Then I said there is no person who knows so well the men who can successfully guard the territory under license as the licensee who owns and works the territory. He has in his employment men who are familiar with the topography of his limit, who know where the timber is situated, and the dangers and exposed points, and that these were the kind of men that ought to be selected for the purpose we had in view. I said that in addition to possessing this knowledge, the licensees should be requested to select men of cool judgment and sympathetic nature, men who can sympathize with settlers in their difficulties, as well as with others whom they come in contact with, men who were anxious not to antagonize the people in the forest, but if possible enlist their support and sympathy to make the service a success. My experience had taught me that if you antagonize these settlers you might as well cease any attempt at forest preservation. I had the immediate support of my minister and his consent to make the first attempt at fire ranging. In that year, 1885, I think, we asked the Messrs. McLachlin Brothers, of Arnprior, to try the experiment upon their limits. They nominated ten or fifteen men to act as fire rangers, we appointed them, and clothed them with authority, and the Messrs. McLachlin Brothers agreed to pay half their wages and the expenses, whatever they might be. The experiment was a success and the following year we issued circulars to all licensees, explaining to them what we had in view, and inviting their assistance and co-operation. We found an immediate response on the part of the lumbermen. This was natural as they had a greater interest in the protection of the timber than we had. Our interest was about \$1 per thousand and their interest at that time was probably four or five dollars a thousand. However, we were willing to pay half the expense of the fire ranging with the result that we have gone from year to year until last year this system of fire ranging met with universal

approval and the original staff of eleven men was increased to between three and four hundred. We have accomplished a great deal in keeping down forest fires by pointing out what the law is and how great a crime it is to set out a fire in the forest during the heated term. Not only so, but we have gradually enlisted the support of the settler, explorer, surveyor, &c., &c., and indeed everybody who has to go through the forest during the dangerous period. The creation of a sympathy with our object I regarded as of more importance than just pointing out what the law is. You can get a great deal more done by the willing aid and sympathy of a body of men than you can by threatening them with the terrors of the law, so it has come about that the system we initiated has become, I think I am fairly within my rights in claiming, a magnificent success. As you know, political parties in this country are very sharply divided and criticism is very searching and severe upon all matters of governmental management, but I am proud to say so far as the fire ranging system of Ontario is concerned we have never had an attack upon it from either side of the House, and the system which was put in force by the late government, which I had the honour to serve, has been increased and extended by the government which I have now the honour to serve, so that there is no difference of opinion between the two great parties as to the wisdom of protecting the forest from destruction by fire.

Something has been said to-day about railways. It has been contended that you cannot build a railway through the forest without having the country through which it passes devastated by fire. Now, when the Canada Atlantic railway was under construction, Mr. J. R. Booth the owner of it, was a lumberman, a resident of this city. He had the confidence of the government, and we asked him to assist us in every way possible so that the danger of fire occurring along his railway might be reduced to a minimum. He promised to do so, and he kept his word to the very letter. The result was that during the construction of that railway, and it was built through one of the most valuable pineries of the province at that time, no fire destroying any quantity of timber worth mentioning occurred along the line or near it. Then recently, as most of you know, the province has been building a railway extending from North Bay to the head of Lake Temiscamingue, and we are hoping to extend it in the near future to a junction with the Grand Trunk Pacific. Our railway is also being built through one of the most valuable pineries in the province of Ontario, and we have taken every precaution that we could think of to prevent destruction by fire of the timber along and adjacent to that railway. Not only have we put fire rangers along the road fairly close together, but we have taken the new step of purchasing railway velocipedes for our rangers. These men are stationed a few miles apart, and they are instructed to follow every train through their division into the next where there is another fire ranger who follows it out of his division, and so on, the object being that if sparks or ashes fall from the engine the ranger may be able to put them out before a fire assumes any proportions. The result of that close supervision is that we have had no serious forest fires upon the line of construction of that railway. Now, what we have done there, I think can be done on other railways in other localities with just as great success.

In addition to the protection of the timber from fire by the presence of fire rangers, there is another feature which commends itself to the lumbermen, that is, if a forest fire occurs in territory under license their fire ranger is immediately on hand,

and being an experienced bushman, he is able to estimate the quantity of timber damaged and to report to his chief or the government, as the case may be, the quantity of timber damaged and how seriously, so that steps can at once be taken to cut it should that be found necessary to save it. I have found that this practical common sense feature also commends itself very strongly to those interested.

Now, I have said so much in connection with fire ranging, because after all, the practical question is, I think, the conservation and protection of the property you have. It is of no benefit to theorize upon what you are going to do or to have in the future if you are neglecting the protection of what you own at the present time. The great thing is to make sure of what you have, protect what you have, and then go on and endeavour to reforest as you may desire and be able to do. Under the system prevailing in Ontario, we have not been perhaps able to put an absolute end to forest fires, but we have at any rate minimized them to such an extent that they have practically disappeared from the forest areas of the provinces. This being so, I think we have reason to feel gratified with the system in operation in Ontario.

I may say, Your Excellency and Sir Wilfrid, that the province of Ontario was the first to put upon its Statute Book an Act punishing people who set out fires in the forest during dangerous periods. It is said that imitation is the sincerest form of flattery. Other provinces of the Dominion and even in the United States have copied our example, adopted our legislation and practically put in force our fire ranging system.

Something has been said about the forest wealth of Ontario. It is a rather difficult matter to give a close estimate of the value of our forests. I do not like to prophesy. I have made it a rule of my life, in so far as I have been able, to confine myself in making statements to things that are within my own knowledge and matters of fact. It is a very easy thing to theorize and say what may happen or occur, but after all the valuable thing is what a man is able to state by actual knowledge. Now I am prepared, if my minister were to say to-morrow: We want to sell from ten to fifteen billion feet of white pine, to answer: Very well, sir, I think we can find that quantity for you without any difficulty. A mistaken idea is that our pine timber is exhausted, or is about to be exhausted in the near future, but that is not so. I have mentioned the fact that we could find ten to fifteen billion feet of pine on Crown Lands, and I want to say that I think there is anywhere between five and ten billions of feet on lands under license, which are being cut upon from season to season by our lumbermen.

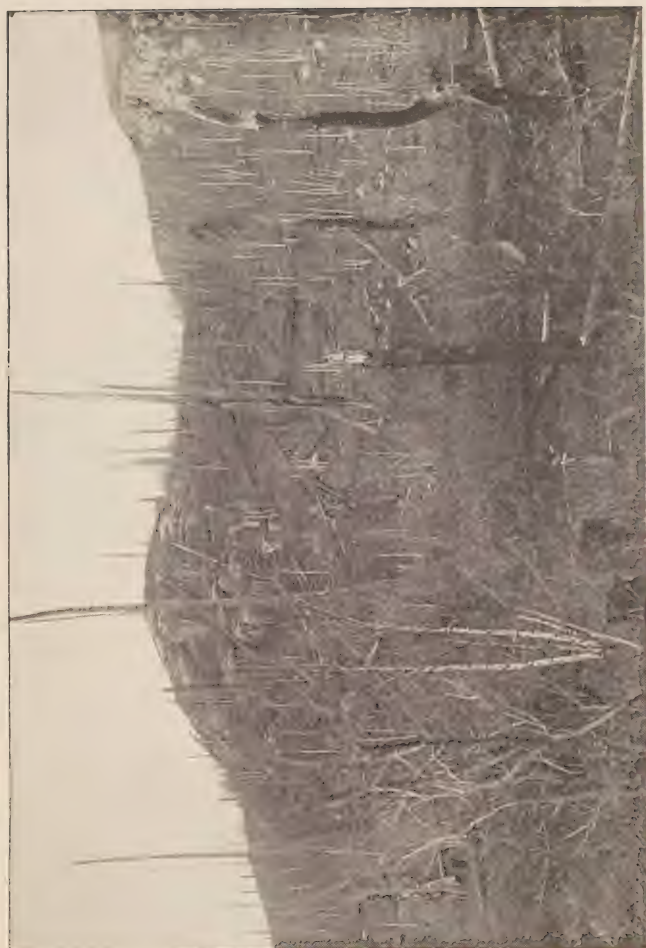
One of the most difficult questions in connection with the protection of the timber wealth of the province and, no doubt, of any province having large areas of timber, is the question of settlement, that is, the damage that is done by settlers who go into the forest to take up land. I had the honour and pleasure of attending the Forestry Convention held in Washington last year and the very, very great satisfaction of hearing His Excellency, the President of the United States, address that convention for about an hour upon the subject of the forest wealth of the nation, and I do not think that I ever listened to a more enlightened exposition of what the forest policy of a nation should be than I did when I heard President Roosevelt express his views. He said one thing that appealed to me very strongly, viz.: 'As to the man who goes upon the public lands of the United States for the purpose of making a home for himself and his family

and is bona fide in his intentions of becoming a settler, my sympathy is with him, my desire is to aid him and we are going to do everything possible to make his lot easy, but as to the man who goes upon the public lands of the United States for the purpose of despoiling them of their timber and then deserting them, I am against him all day and every day.' Now that rule ought to be made part of the policy of our province in respect to lands in the back country. I said last year, when I had the honour of presiding over the annual meeting of this society, that we ought to do something in the form of resolution urging upon the governments of the Dominion and the provinces to endeavour to draw some line of separation between the lands that were suited for settlement and capable of supporting a farming community, and those which had no value for settlement but were well suited for the growing of timber. In my opinion a most important step towards the preservation of the forest wealth of this province or of any province would be to draw the line strictly between lands suited for settlement and those suited for growing trees, and to confine each to their proper use. This has been put before you to-day very forcibly and very eloquently by Mr. Pinchot, and I am merely echoing him when I say that the lands in this province should be put to the use for which they are best suited. If certain parts of the province are rough and best suited for growing trees, then, in the name of common sense, let us keep people out of there and prevent the destruction of the timber. It is an act of folly to allow people to come in where they cannot possibly make prosperous homes, to cut away the timber and then abandon the land, leaving a blackened waste as an eyesore in the landscape.

Having spoken about the utilitarian side of this question, I want to say a word or two about the beautiful, and there I cannot help being reminiscent. When I was at that great meeting in Washington last year, I, at the close of some remarks I made, said that upon many occasions as a youth I had played Indian in this country, hundreds of miles from any white settler and that it was one of the greatest pleasures in my life when I had passed over a portage, with my canoe on my head, to put the canoe down and then gaze at the beautiful sight that lay before me, perhaps a beautiful little lake surrounded by green trees, just like a diamond set in emeralds. Then I said I had gone back a few years afterwards to that locality, and lo, that beautiful landscape had become a blackened waste; and I said if there were nothing else but the love of the beautiful it ought to be sufficient incentive to protect the forest from destruction by fire. Upon retiring from the platform a lady came and thanked me on behalf of eight hundred thousand ladies of the United States. She said she was there as the representative and delegate of the Ladies' Clubs of the United States, who were doing everything and intended to do everything possible to assist in building up a sound public opinion on the question of the public protection of the forests, and, Your Excellency, I need not assure you that not the least important element in the formation of public opinion upon any question is the sympathy and aid of the fair sex. I afterwards had the pleasure of meeting this lady at a reception at Mr. Pinchot's house and she was more than kind to me, introducing me to a great many celebrated people, and I found that in that instance, in saying a few words for the beautiful, I had been casting my bread upon the waters and it had come back to me many fold.

The premier of the province of Ontario, the Honourable Mr. Whitney, was very anxious to be here himself to assist by his counsel and to support anything that might be done to carry out the object for which we are met. He found it impossible to be

here. Then my own Minister, the Honourable Mr. Cochrane, was in hopes that he would be able to come here until almost the last minute, when it became impossible for him to do so, and he has asked me, as his representative, to express to Your Excellency and Sir Wilfrid his very great regret at not being able to be with you, his entire sympathy with the objects of this meeting, and his strong determination to do everything in his power to protect and conserve the forest wealth of Ontario. We are, assured, in so far as the province of Ontario is concerned, that we shall not only move along the lines we have been doing, but that we have got what may be called an ideal forest policy. Mr. Southworth has spoken to you about forest reserves. Our policy with respect to forest reserves is this: When we find that there is a large body of pine or other timber suitable for lumbering purposes we create it into a forest reserve, taking it out of the market for settlement and declaring it to be reserved, so that we may deal with it in the most enlightened manner possible when we come to dispose of the timber. We have done that in respect to the great Temagami forest reserve, in which there is estimated to be anywhere between four and five billion feet of white pine. We have done the same thing in respect to the Mississauga reserve, in which we believe there are three or four billions of feet. In the eastern parts of the province we have set apart as a forest reserve regions in which pine timber has been cut away, and recently we have set apart a very large reserve around that queen of lakes, Lake Nipigon, one of the most beautiful sheets of water in the whole Dominion of Canada, and that is saying a very great deal indeed. It is our intention to prevent the destruction of timber by fire or lumbering or anything of that kind until we make up our minds as to the proper policy to pursue. We have also set apart the Algonquin National Park. There the timber is under license, part of the territory being under license for pine only, and part of it for all kinds of timber, but we are protecting the forest growth as well as the game and it has become a perfect reservoir of animal life. We are protecting the fish, and we are making this park a recreation ground for the people of this province. Not only are we creating a recreation ground for our own people, but we are inducing thousands of our neighbours from the other side of the line to come here, see our forests and enjoy them as play grounds and health resorts. They come here, spend their money amongst us, go home, strengthened and invigorated, and we are very glad to have been their hosts. I am indeed pleased to be here. You who have been associated with me in this society know that I have always taken a deep interest in matters pertaining to forest protection and conservation, and that in connection with any movement looking to that end I am ready and anxious to do anything that I can. We civil servants are supposed to be silent folk. We are not expected to talk. Our duty is to give our ministers the benefit of our thoughts. If we have opinions they are not necessarily for publication. Nevertheless, being away from the centre and surrounded as I have been to-day by people actuated by the best of motives and anxious for information, I have felt at liberty to give expression to some opinions and views upon the matters which have brought us here.



A RUINED TRACT IN DISTANCE.

DR. B. E. FERNOW,

Author of 'Economics of Forestry.'

I am very much gratified to be here and to have an opportunity of saying a few words in this representative assembly, although I am not a representative; I represent nothing and nobody but myself. Perhaps I might claim to represent that small body of early reformers who laid the corner stone and began building the foundation walls of that great structure that you are going to erect into the forestry system of the Americas. Twenty years this work was started and I think we should be gratified to find the building so far progressed in Canada as to make this great convention possible.

Reform movements are slow in maturing. It took 75 years to abolish slavery in the United States and that was a question that touched the heart and the human soul. Here we have a mere economic question. If in twenty years we have so far progressed that we discuss forest policies, such as were discussed for the province of Ontario, and can point to such effective service against fires from railways and other causes, it is surely a great achievement.

I do not know that I can discuss any of the interesting papers that were read this afternoon. They are almost beyond discussion, being mainly statements of fact, but if you will allow me to refer also to the remarks made this morning by His Excellency and Sir Wilfrid Laurier, I would at least express my satisfaction at these evidences of a change of attitude on the part of the government.

I suppose this is a revival meeting, the object of which is to reform somebody, some sinner, some delinquent. It is very rare that the reformer at a convention can point his finger at anybody and say: Thou art the man! The sinner is usually absent. But here you have the rare opportunity of having the sinner with you, and you can point your finger at him. You can lay bare his iniquity, you can show him how to mend his ways. No doubt you all know whom I recognize as the sinner. It is not the lumberman, who has been accused so often. There was a time when the lumberman was continuously brought forward as the sinner. I am rather glad to notice that so far he has not been mentioned, even once. I suppose it has at last been recognized that whatever wrong he has done was done under compulsion; he could not help himself, circumstances and conditions compelled him to do what he did. You have to look beyond for the sinner, and go for him even if he has repented as much as he seems to. Your great sinner is none less than your government. The Dominion government has confessed through its Prime Minister that it has neglected its duty long, and has shown that it has begun to mend. The provincial governments, as a rule, have not done very much, and although Ontario has made a good beginning at reform, much remains to be done even by her.

The sooner you realize that the whole responsibility of the mismanagement of your timber wealth is chargeable to your government alone, and that government alone can remedy it, the sooner will you find the remedy.

While the retention of the land is, to be sure, a fortunate promise for the future, the method of disposal of the timber on it is open to great objections, and capable of immediate improvement.

Most of the talk here has been about future forests, future policy, planting for the future and all that. But why not say something for the present? We are living in the present and for the present, and if there is anything that can be done for the present forests, we should do it immediately. Now, there is one sin of these governments which has not been pointed out, and which, I believe, is responsible for more forest waste than even the railroads or the settlers—and that is the way the limit holders are dealt with. The governments of your provinces have put a premium on forest destruction by the manner in which they dispose of the timber on their lands. They charge three prices for the timber, one far below market price and the other two speculative in their nature. All of you know, of course, that there are to be paid stumpage dues, which is a proper charge to make and these are properly charged by the thousand feet cut. The timber is measurable and the charges are readily computed. But the rate is made far below market price. To make up for this deficiency there is another charge, a bonus, which must be paid in advance, a speculative amount, which the lumberman must lock up as so much capital. And, thirdly, you pay the ground rent by the year. It takes a mathematician, and a very good one, to figure out what the stumpage really costs. There is so much speculative element in these two additional prices to the stumpage dues that it is almost impossible for even a good financier to estimate in advance how much he can afford to pay for the stumpage he is getting. Now, in every speculation there is an uneconomical use of something. Somebody suffers in a speculation always. In this case it will surely be the forest. The bonus acts with its interest accumulations like an excessive tax, which induces the limit holder to get the timber off his limit as fast as he can, to take off all that can be taken, to cut unconservatively. A simple fair stumpage rate, gauged from time to time to market changes, would avoid this wasteful speculative element.

I believe this to be a subject of great importance calling for reform in your method of handling government limits. And it has the advantage that there are no difficulties surrounding it, it can be readily settled in the cabinet by the stroke of the pen, and applied immediately. I recommend to your association a careful perusal of the full and excellent discussion of this subject in your Journal by Dr. Clark, and to your governments the propriety of investigating and adjusting before all else this baneful method.

Although your various governments have seemingly begun to realize it, yet there is still need to accentuate and drive home the fact that ultimately the governments alone are capable of carrying on a forestry system. The reason for this is the long time it takes to mature a timber crop. This long-time element, which is peculiar to the forestry business is against the practice of forestry by private individuals, except in small woodlots. You may point to Germany, and show that large forest areas there are in private hands. But when you come to investigate further, you find, first of all that the government has about one-third of the forest area under its direct control and management. Then, communalities, which are under the direct control of the government, own from 15 to 18 per cent, leaving only 50 per cent in private hands, but of the privately owned forest property, 25 per cent is under the strict supervision of the government, while about 15 to 20 per cent of it is in entail—that is, it is worked under a contract between the family that owns it and the government, the government being charged to prevent the destruction or mismanagement of the estate. Hence, only a small part of the forest land in Germany is really under uncontrolled private manage-

ment. And, if you want to see woods that are mismanaged, you will find them among the privately managed forests of Germany.

The final aim then must be for the government not only to own but to manage the timberlands. When this is fully realized, I would urge the provincial governments, which own the commercially valuable forest areas, to study the propriety of spending money now in recuperating the cut-over limits, for the sake of the future. Forestry is not a profitable business if by profit you mean the taking of money at the present time. Forestry is profitable only in the long run. The profitableness of the German forests which has been cited here, has only come of late, as a result of expenditures made many years ago.

The governments which with a statesmanlike vision into the future are willing to make sacrifices now, and spend something in keeping or making productive their timberlands, are the ones that will earliest reap the benefit.

MR. JAS. LEAMY,

Crown Timber Agent, New Westminster, B.C.

As you have stated, Mr. Chairman, I am employed by the Dominion Government, and am in charge of the forest fire rangers of British Columbia. We have charge of what is known as the Dominion railway belt, extending from the coast to Laggan, a distance of about 500 miles by about 40 miles in width. In that district I have eight permanent fire rangers, which number is increased at any time when it is desirable—say, during the dry season particularly. Since the inauguration of the system in British Columbia we have been fairly successful in protecting the forests from destruction, a statement which will be borne out by the gentlemen here from British Columbia, as well as by the lumbermen of that province. The Dominion government pays half the cost of the fire guardians, and the lumbermen pay the other half. At the meeting held at Quebec last year, it was stated by a prominent British Columbia lumberman that they were well satisfied with the system conducted in British Columbia, and were willing to pay three times as much money as they were paying for the protection of the province. That was certainly very flattering to the men in charge of the work in British Columbia.

During the last season, which had been the driest in my experience, or even during my residence of twenty-seven years in the province of British Columbia, we had very many fires. We managed to prevent the destruction of any merchantable timber, though we had a good deal of young, growing timber destroyed by these fires. These fires arise from three or four different causes. One is prospectors. These men who go through the country looking for minerals will sometimes burn over a great area in an effort to burn off a small patch to expose the rock, in order that they may locate any mineral that may be there. Another cause is the settler, who in clearing his land, ignites fires and sometimes starts great fires that burn valuable timber on a very considerable area. Another cause, and one over which we have no control, is lightning. One fortunate circumstance connected with fires started by lightning is that they originate on the tops of mountains, and it is easier for us to fight them because of their slowness in coming down. But a fire started at the bottom of a mountain will go up faster than a man can walk, and consequently they are bad to contend against. Besides, thunder storms are accompanied with rain, which assists in putting out fires

started by the lightning. During the last season, however, we had no rain. We had many electrical storms without rain. I had to employ more men to fight the fires. Our great difficulty was to get something for the men to drink. The small streams had dried up on account of the dryness of the season. You must understand that our mountains there are five and six thousand feet high, and it was not easy to keep men up there fighting the fires and have others carrying up water for the fire fighters to drink. It took as many men to carry the water as were engaged in fighting the fire, and the difficulties of the service made it hard to find men who would engage in it. Another cause of fire is the railroad locomotive, a subject which has been discussed in this convention. The law of British Columbia compels the railroad men to use a screen in the locomotive. But they find the mesh too small, for if an engine was outfitted with the smaller mesh she would not steam. When the smaller mesh is used, the remedy is to get up on the smoke stack with a bar and open up the screen a bit. You may have heard that the province of British Columbia is somewhat hilly. We have to use the brake on the open engines coming down hill. And I have seen a stream of fire emanating from the brake block setting fire to everything on either side of the track. Then the section men who look after the track will use the dry season as the time for cutting weeds. These weeds are piled up all ready to be set fire to by the sparks from the brake block or by a cigar stub thrown out of a window by a passenger. These things cause serious fires and the destruction of immense quantities of valuable timber.

The provincial government of British Columbia have not used any system of fire protection. The provincial lands which inclose us on both sides are unwatched, and if a fire occurs there, we have to fight it to prevent it from coming on the railway belt. A newspaper in British Columbia remarked last year that if the provincial government did not wish to save the timber for the value of it, they should recognize the fact that a very important asset of the province is its scenery, and that the smoke of forest fires prevented people passing through from enjoying the scenery; and for this reason, if for no other the provincial government should fight the forest fires on its lands. However, they have not taken the hint so far. Our timber is very large, particularly on the coast. The bark is very thick. I have seen bark a foot and over in thickness on the tree. Fires passing through such a forest do not hurt such trees for the first year, but destroy the young timber. But the second burning is apt to kill the big trees and so prevent the reproduction of the forests. This is particularly true of the interior districts. The ground is fairly carpeted with young cedar and pine, the same timber as formerly covered the ground. But if the land gets two or three more burnings, the big trees will be destroyed, and so the forests cannot be naturally reproduced. In passing through the parliament grounds to come to this room, you saw, in front of this building sections of British Columbia fir and spruce. You can readily understand that it takes a long time to produce timber of that size. One section of fir that is there is estimated to have required six hundred years for its growth. At the same time, in the province of British Columbia the young timber grows very quickly, and if we can prevent the fires passing through this young and growing timber, we shall have fair merchantable timber within thirty or forty years. In a hundred years we could have a good growth of timber all through the province again, if proper steps be taken to keep out the fire. I am not much accustomed to

addressing large audiences, and so shall not speak longer ; but if any gentleman wishes to ask questions concerning forestry in British Columbia I shall be glad to answer if I can and to give any information that I have.

DR. C. A. SCHENCK,

Principal of the School of Forestry, Biltmore, N.C.

I wonder if really you are not tired of this talk about forestry. I am a forester myself, but I sometimes think we can have too much talk even about so important a matter. I think that it is the sentimental side of forestry that has the greatest power in bringing us together and causing us to enjoy this discussion of forestry questions. Here we are all together, Englishmen, Frenchmen and American. And, even when a poor German ventures to step upon this platform, I think he finds you all in accord with him in the love of the sentimental in forestry, the love of nature as seen in the forest. But, for common people to go into forestry for sentimental reasons is out of the question; consequently we have to step outside ourselves, so to say, and look at the economic side of forestry, and just now, of Canadian forestry. Just here in Canada, it seems to me, you face the problem of forestry under auspices such as no other country has ever had. You have the opportunity to consider and profit by the sad experience of other nations. And you have at your disposal a forest area so overwhelmingly great that I cannot conceive of it. Two or three millions of square miles of forest! I have always been accustomed to think that I have charge of a big forest; but that forest is only 180,000 acres. The task that faces you is so great as to be overwhelming.

It seems to me that your proper policy has three main features—your platform should have three planks. The first of these is that the Dominion and the provinces must retain in the hands of the government, in fee simple, all the exclusively forest lands. That is to say, all lands which will pay a better dividend if kept under trees than under grain or cattle, should be owned by the government. I do not think that this idea is absolutely carried out anywhere. For instance, how can you know whether to retain as absolute forest land a certain portion of the country if you do not know just what it is fit for. Your surveys are good—very good. But do they tell you whether township No. 367, for instance, is of a character that should be kept under forest, or whether it is agricultural in its nature? Do they tell you what sections should be those upon which the settlers' happy fireside should gleam, and what should be reserved for the stately forest? Do you expect the settler himself, the common man from some foreign country—say, from Germany—to know just where he should settle? I think it is the duty of the people who are already here to guide the immigrant, to direct the settler paternally in such a way that he shall not make mistakes, that he shall not in after years grow despondent and careless because he has settled in the wrong place, but shall go upon the land where his labour will meet a fair reward, and where his family can be raised under favourable conditions. If settlement is not thus directed, the population which you will obtain will be apt to settle in sections where they cannot prosper. As a result, they will grow despondent, and will become not only a disgrace but a danger to your commonwealth. I have myself quite a little to do with this problem in far away North Carolina. It is easy enough for the private individual to practise forestry if he is left free to do so, but when you are faced with the problem of 486 squatters, each of whom sees in you an enemy, each of whom seeks to take advantage of you in every way, what opportunity is there to prac-

tise forestry under such conditions ? Keep your forests for the practice of forestry ; keep the settler out of them ; do this, and you will benefit not only your forests but the settler as well.

The second plank of your platform is one which we have already discussed here—protection from fire. What is the use of elaborating a forestry policy unless a part of that policy is to safeguard the very material upon which you depend for results ? Whoever builds a house without taking pains to safeguard his investment ? We insure our houses ; we insure our property of every kind. Yet, here is this gigantic body of our national wealth which is left wholly unprotected. Here and there some small attempt at safeguarding the forests is made. But, when the government ownership of the forest land is asserted as a permanent and unchangeable policy, the protection of the forests must be the paramount issue.

The third plank in the platform—everybody's platform, I suppose, for I am sure all will agree to this—is that forestry must be made a paying investment, whether the individual or the government is the owner of the forest. This means that, just as in any other great business, a department store or any other, we must have a good organization. If you will allow a foreigner to criticise you, I would venture to say that there is much still to be done both in the provinces and in the Dominion. The forestry work here is largely scattered among various branches, causing a great deal of friction and lack of perfection in methods. The sale of the timber is attended to by branches entirely different from those which have charge of the production. It seems to me that concentration and amalgamation of the branches is absolutely necessary to carry through an efficient business policy. Canada is in the beginning of its development. We Germans on the other side of the big pond used to call it the infant giant. By the time the infant is grown to be the big giant, fifty years from now, let it be said of this giant that he has a system of forestry made upon a gigantic scale.

EVENING SESSION.

WEDNESDAY, January 10, 1906.

The evening session was held in the lecture room of the Normal School, Rt. Hon. Sir Wilfrid Laurier presiding.

THE FOREST AND WATER SUPPLY.

HON. SYDNEY FISHER,
Minister of Agriculture.

I feel very much interested indeed in the question of forestry. I love the trees, I love them for the beauty and comfort especially that they lend to country life, and it is to country life that I am wedded. People in cities appreciate, no doubt, the trees, but to us who live in the isolation of country life they are a constant companion and they add much to the interest as well as the beauty and comfort of our surroundings. For this reason I am interested in forestry, but I am interested in it also because of the enormous economic value that it is to the country. To no country probably is it of greater value than it is to Canada. I will not dwell on what was so ably put before the convention this morning in regard to the forests and the trees of our country, but there

is one point on which I do wish to say a few words in opening, before I come to the special subject of the evening, a point to which I think this convention ought to refer, and which it ought to keep in its mind in regard to the question of forestry in Canada. We think of forestry as connected with the wood industry and with the production of lumber, timber, fire wood and pulp wood. We must think of it, however, in another sense which I think must be admitted to be of even greater importance. This morning Mr. Pinchot spoke of this as an age of steel, and he pointed out what an important part wood plays in the production of minerals such as iron and coal, and how essential it is to these industries. I grant it fully, but there is another way in which I think the forests of this our land are of even greater importance to the future industries of Canada.

This is to-day an age of steel, but we are on the threshold of the age of electricity, which is largely going to take the place of steam and steel in the economics of the world. We have an agricultural country in Canada and nobody more than myself values the agricultural wealth and production of this country. I believe most thoroughly that for many generations agriculture will be the most important industry in Canada. But, with it and as attendant upon it we are to-day experiencing great industrial progress and great industrial improvements, and among the things that are most continuously and most constantly put before us in regard to the industrial future of the country to-day are the possibilities of electricity and the production in Canada of electrical power which will be the servant and hand-maid of our industries. In many parts of Canada we have not any great abundance of water power and in some others we have, but everywhere we may have the advantages of electrical power. Now, it may seem at first sight rather a far jump from forestry to electricity, but if in Canada we are going to have great electrical development and the development of great electrical power it is going to be through our water powers, and our water powers are dependent upon our forests. If, in the future, our water power is going to be great, if in the future we are going to continue to have the advantages we have to-day in regard to the production of electrical energy, we must realize that these depend absolutely on the conservation of our forests. They act as a great sponge at the headwaters of our streams and rivers, and conserve the moisture which supplies these streams continuously through the year, and they are an absolute necessity to the uniform maintenance of these streams. The measure of the water power is its measure at the lowest water of the year. We may have, and do have, plenty of power at times, but if we are to have satisfactory and abundant power generated by water the measure of that power is the measure of the low water of the stream. Our forests improve the flow of water in our streams and prevent them from becoming too low for the purpose of developing power. With the denudation of the hills and uplands where our streams take their rise we have in the springtime floods and freshets which not only are of very little use for water power, but which are dangerous to the development of that power, and are liable to destroy the dams and machinery which are necessary accessories to the creation of that power. Later on in the season, if the headwaters of our streams have no forests to conserve their moisture, we will have droughts and low water, so that there is an entire absence of water or the water power is lessened. If in the future we are going to develop in Canada, for the development of our industries, immense electrical energy, and if Canada is to have the industrial future that we are looking forward to, we must for that purpose, more than any other perhaps, conserve our forests and see to it that

our water courses are maintained at an even and steady flow through the whole season. I bring this forward because so far it has not been touched upon in my presence, although others perhaps have thought of it and brought it forward when I was not there. That applies chiefly to this eastern part of Canada, and also no doubt to a certain extent in British Columbia.

But, the particular subject that is before me this evening is that of forestry in connection with irrigation, and I want to say a few words in regard to it. I think that it is a subject which comes in more particularly in connection with the development of our western domain. You are all well aware of the conditions which are to be found in our prairies. You are aware of the fact that we have on our prairies, especially in southern Alberta, a large area of semi-arid country, a country which, in many ways, until quite recently has been supposed to be quite incapable of ordinary cultivation for the production of farm crops. We have had a few comparatively moist seasons, and the result has been that many thousands of acres of land have been cultivated successfully, producing large crops, which but a few years ago were thought to be only fit for the production of grass and that in insufficient quantities for the purpose of grazing.

We have there a large area of country which I would like just briefly to describe. Stretching away eastward from the lower hills of the Rocky mountains, south of the Canadian Pacific Railway, we have a slowly descending plain, descending eastward and northwards, with a very considerable fall all the way from the mountains to about Regina. I am speaking generally; I have not absolute details or a map before me or before you, but speaking generally all the way from the foothills of the mountains to about Regina. Over that area water generally is scarce, so scarce that in many parts of it, without irrigation, successful cultivation is supposed to be impossible. I do not like to say myself positively that successful cultivation is impossible anywhere because, in the development of our North-west especially and in the development that has taken place in many ways all over Canada, we are constantly, from year to year—I might almost say from month to month—discovering new possibilities in the development of our country which our fathers and even people who have settled as recently as ten years ago thought to be quite impossible. Therefore, I guard myself very carefully when I suggest that over a portion of that area, at all events, there is doubt about the successful cultivation of ordinary field crops. We must then look for some assistance to the ordinary climatic conditions for the cultivation of field crops because that is the area of our country to which the whole world—not only Canada, but the British Empire, and I might say the whole world—is looking for its future wheat supply. That is the portion of our great prairie to which the world is looking for its future wheat supply and it behooves us therefore to see what we can do to make the production of wheat and other field crops there assured year in and year out without reference to what may be a particular season's climate. We are fortunate in many ways in looking forward to this.

Just to the west of the area I have described we have the eastern slopes of the Rocky mountains. The eastern slopes of the Rocky mountains are clothed at the present time almost entirely with a forest growth—a forest growth, which, perhaps some lumbermen might not consider of the greatest value, a forest growth which does not compare with the growth of the forests in British Columbia, and does not compare with the growth of the forest in the old days in this Ottawa valley, but still a very consider-

able forest growth, a forest growth, which, at any rate, is quite sufficient to conserve and keep permanently conserved all the water supply which flows down through the streams on the eastern slopes of the Rocky mountains, most of which water eventually finds its way into the Saskatchewan river. Up to the present time I do not think that any material inroads have been made into that forest growth, but I venture to predict that unless the greatest care is exercised to preserve that forest growth in the near future, the moisture of our plains will be considerably sacrificed and the mighty rivers, which to-day come out of those hills and course through that prairie region will be turned, in the spring time, into floods and in the summer time into dry watercourses. These great rivers and streams have cut deep courses through the fertile prairie, and as a general rule the watercourse itself is considerably sunk below the general prairie level. The farther and farther you go from the hills the deeper and deeper becomes the valley in which the river runs. Fortunately the general descent of the whole plain is so great that it is not a very difficult task to take the water out from the upper reaches of these rivers, and by carrying it along on the upper levels over the prairie and keeping it within bounds we are able to distribute it over large areas of that country, and thus through irrigation securing and ensuring the future development and cropping of the country. I believe that this is one of the most important pieces of work which the government and people of this country must see to in the future. I am glad to be able to say that at the present time no serious inroads have been made in the forest of the eastern slope of the Rocky mountains. Up to the present time no serious damage has been done, but I venture to think that unless the greatest care and the greatest foresight are exercised in the future very great damage will be done, damage which would be irreparable and which would interfere with the development of that prairie region. I am speaking just from a mere cursory observation during this last fall of that country.

I went to Southern Alberta for the purpose of investigating and examining certain irrigation works which are already in existence, being carried on by the Alberta Railway and Irrigation Company. I found a very successful piece of work, a piece of work which is carrying out exactly the lines of thought I have indicated and which has already done a great deal in proving that in that country all kinds of crops can be grown if water is supplied to that fertile soil. I found there that great as that undertaking is, and it is now on a very large scale, there is a still greater area than it is possible to irrigate which has never been touched and upon which no irrigating work has taken place. To secure such work being done and to secure the investment of capital it would be necessary to have the assurance of abundant water supply in the future. Nobody is going to undertake irrigation works unless he is quite sure that not only has he at the time of making the investment a sufficient supply of water to justify him in undertaking the work but he must be assured that in the future he will be able to have the advantage of an abundant water supply absolutely secured to him and this assurance for the future can only be brought about by the government taking the matter in hand and seeing to it that the necessary precautions are taken to insure the continuity and certainty of this water supply.

I do not think, speaking to a meeting of people interested in forestry, that it is necessary for me at the present moment to dilate upon the manner in which the conservation of our forests should be carried out so as to secure a steady and continuous water supply; but I want to say a few words in regard to the way that would work out

a little farther on the plains. If we have irrigation works stretching eastwards from the Rocky mountains, we will be going into the very country which is to-day the most arid of all parts of Canada. It is not really arid. Everywhere through that country there is grass, everywhere through that country there is herbage sufficient to sustain the stock ranging over it. It is only a matter of a little water supply that is required to enable the country to continue as a range country, and if in the future through irrigation it is possible to supply the cattle with water and feed we can have a condition of affairs such as we have in the neighbourhood of Macleod. Let me here mention what I have found under my own observation. I passed through that Macleod district four or five years ago. At that time it was common talk that it was only good for ranchers, only good for the sustenance of cattle, and the common estimate was that it took 20 acres of that land to carry a steer. It is held to be good range land, some of the best range land on the continent of America. Our feeding ranges are good, and yet it took in the neighbourhood of 20 acres to carry a steer. I went through that same country this fall and what did I find?—I found thousands of acres of that same land (20 acres of which it had been estimated were necessary to carry a steer) under the plough, under cultivation, and having produced some of it for as much as three seasons, year after year, from 30 to 50 bushels of wheat to the acre; 30 to 50 bushels of wheat to the acre in place of one-twentieth of a steer to the acre. Just think for a moment, if you can take it in, of the contrast between the productive capacity and richness of that territory under these two systems. On the one hand, you have the open range where one-twentieth of a steer can be carried to the acre, while on the other you have the country under cultivation and producing from 30 to 50 bushels of wheat to the acre. No investment of money in this country could be better made than to secure a change of that kind over a large area of our western plains. What I speak of occurred without irrigation, in consequence of three or four seasons of comparative moisture, but with irrigation what I have said would occur over larger areas still and with a greater assurance of permanent success.

It is therefore necessary to see that this is possible in the future. I will not picture the difference between a range country and a settled country. I will not dilate to you upon the difference, but as you go through a settled country you will see farm after farm, house after house, family after family settled upon the land, every 100 or 200 acres of it carrying one or two families, while in comparison with that in the range country you will find thousands and tens of thousands of acres of land over which cattle roam, the whole supporting ten or a dozen men and their families. The contrast is sufficient to strike everybody, and I am sure everybody will appreciate the difference between a range country and a settled country. The settlement of that country can only be brought about by conserving the water in such a way that it may be maintained and utilized for agricultural purposes.

Now, I am going to say a word or two more in regard to what will result in that country. Where irrigation is practised, as it is in various parts of the United States, they have large canals leading the water down, and from them lateral canals, and from these lateral canals little ditches eventually leading the water out into the furrows in the field. To-day the whole tract of which I am speaking is a treeless plain: to-day there are hardly any trees in sight. The wind sweeps over that unbroken plain. The wind sweeping over the plain makes it drier and drier, and the conditions of the climate, as well as of the country itself, are such as to ensure dryness. Given a few

canals, given a few lateral ditches, the first thing that anybody who is engaged in irrigation work would naturally think of would be to plant rows of trees alongside of every ditch and canal. With water in the canals and ditches the success of these trees is absolutely assured.

A few years ago it was my good fortune to be in Lethbridge. It was absolutely treeless, and on the surrounding plain there were no trees visible, but when I was there the other day I found in the streets of Lethbridge rows of trees thriving, doing well, their roots spread out in the soil. I went out into the surrounding country, drove about and found trees growing in large numbers. I found farms watered by irrigation, and I found trees around the houses thriving everywhere. I found nurseries of trees being set out and planted for the purpose of being sold, notwithstanding the fact that ten years ago nobody believed it was possible to grow trees in the southern part of Alberta. If then we can secure irrigation canals and ditches, we will soon secure rows of trees all through that country, and it will not be long before that part of Canada will be having the benefit that is derived from the protection afforded by thousands of miles of rows of trees over those plains which have perhaps for ever been absolutely treeless. That is one strong argument in favour of maintaining and securing a water supply for irrigation. Let me mention one thing that has come to my attention, and which has been reported and published all through the country. As a result of the experiments in growing trees at the Indian Head experimental farm, Dr. Saunders has found that for every foot of growth of a tree in a wind break across the prairie there is an influence upon the crop for fifty feet in width; that is to say, that if a tree is ten feet in height, it has the effect of protecting and helping the crop for a distance of 500 feet from the row of trees, and if the tree is 20 feet in height it has a protecting and helping influence for a thousand feet away from the row of trees. Suppose we have irrigating canals and ditches through that country in the way I have described, there is no question but that in a short time there will be an important influence exercised by the rows of trees which will grow on the banks of these irrigating canals and ditches which will importantly and favourably affect the growth of crops all along these canals, entirely without reference to the sustenance and nourishment which the water put upon the land itself may give. The protection of the rows of trees will assist and help the growth of crops making them greater and more assured.

I have thus very cursorily and very shortly put before this meeting what I believe to be one of the most important problems that we have to deal with and face to-day in Canada, one of the most important outcomes of forestry knowledge and forestry education in this country, which will most importantly affect the future of that part of our country. When I say that this prairie is a part of our country that is looked to in the near future as the granary of the empire, you will understand how important not only in the interest of our own country, but in the interest of the whole empire, this question is. I have not attempted to go into the technical side of this question. There are technical experts who can do that so much better than I, that I would not think of presuming in their presence to deal with those matters. I hope that the people of Canada will devote their attention to this problem, and that we shall be able to carry out the work which is required, and I shall be glad if any words of mine shall have contributed in any measure to the accomplishment of that result. I would only say in addition that, thinking of these things and working out these things, when

I came to study the report of the Forestry Association I was delighted to find that Mr. Dennis, who to-day is the manager in charge of the Canadian Pacific railway irrigation works at Calgary, had, in a certain way, pointed out these very same things three years ago in a paper which he read before the Forestry Convention, although he pointed them out, I regret to say, too shortly and too concisely, and I fear that the words of wisdom he then dropped and the important suggestions he then made have failed to accomplish the object which I think they ought to have accomplished; they have failed to attract the attention of many people in this country to the problem. I trust, however, that the expert opinion of such an authority as Mr. Dennis upon irrigation problems, an authority based upon a large and practical knowledge of the country, will support and endorse what I have here ventured to lay before you.

FORESTRY IN RELATION TO AGRICULTURE AND IRRIGATION.

J. S. DENNIS, DIRECTOR OF IRRIGATION FOR THE CANADIAN PACIFIC RAILWAY.

(Read by Wm. Pearce, Calgary.)

The question of the preservation of existing forests, or the reforestation of areas which have been denuded of timber, is, I think, in the public mind, usually associated with the lumbering industry, and the important bearing which the subject has upon agriculture, especially when irrigation is utilized to assist crop production, is not sufficiently understood or appreciated.

It is a fact recognized by all without any consideration of the cause, that countries of great rainfall and humidity are countries of the most luxuriant timber growth, but whether the timber induces the rain or the rain has encouraged the growth of timber, are questions that as a rule do not present themselves to the ordinary observer.

It is also known that the most arid portions of the earth's surface are as a rule devoid of timber, but again the questions of cause and effect are given little attention.

These important questions on this continent have of late years been receiving some attention, owing primarily to the efforts of the forestry associations and government forestry departments, but there is a great work yet to be done in educating the general public to a realization of how closely these matters are associated with the general welfare, particularly in the new provinces of Alberta and Saskatchewan.

The reforestation of the great plains of the west, which are now so rapidly becoming the home of a large agricultural population, or at least the growth of sufficient timber to afford wind breaks and shelter during the winter, are in themselves important questions and intimately connected with the comfort and well being of our settlers, but in the preservation of the forests which now exist on the eastern slope of the Rocky mountains in Alberta we have a matter which is of first importance to the portions of the plains lying immediately east of the mountains, and one which, unfortunately, is not receiving the attention its importance warrants.

Some years ago the writer pointed out in one of the general reports regarding irrigation issued by the Department of the Interior, that the immensity of the disproportion between the water supply for irrigation in the western portions of the Northwest Territories and the area of land in that district available and suitable for irrigation, rendered it desirable that everything possible should be done to conserve the water supply, and stated as follows:—

'In view of the information given regarding the available water supply, and the further fact that the watershed furnishing this supply is useless for grazing or agricultural purposes, and, aside from the small amount of merchantable timber which it supplies in certain districts, is only valuable as a catchment area to furnish water to the thirsty plains and open area lying to the east, it would seem unnecessary to ad-

vance any argument to prove the urgent necessity of preserving this watershed in a condition best calculated to improve or maintain its present usefulness as a catchment area ; unfortunately, however, public opinion and knowledge on this subject are very erroneous, and it is important in the inception of irrigation development to state the conditions clearly.

In the first place, we may assume that any steps calculated to diminish the present water supply are unwise, and if we point out that the rapid destruction of the timber covering the foothill country, which is annually taking place through the forest fires, is calculated to seriously affect this water supply, nothing further should be needed to convince the most indifferent observer of the pressing necessity for preventing and checking these fires as far as possible.

In all countries the relations between forests and agriculture are more or less intimate. The forests receive moisture from the atmosphere, store it in their recesses and through springs and running streams send it forth to water the land. Forests in proper proportion ameliorate the severities of the climate, rendering a country habitable for man, and adapted to the growth of fruits and grains suited to his needs. Floods or droughts seldom occur in a region of forests. Forest products enter into all human activities, and it may be said that the race could not exist in the absence of forests.

In the Rocky Mountain region, where arid or semi-arid conditions prevail, the most important office performed by the forests is the conservation and distribution of moisture. The countries at the base of the mountains and surrounding them would be uninhabitable were it not for the forests which partially clothe the latter. Were the mountains wholly stripped of that covering which nature has so wisely bestowed upon them, but little moisture would be gathered from the atmosphere, violent storms would often occur, and torrents and seasons of drought would take the place of existing conditions.

In this region the direct dependence of agriculture upon the forests is more plainly seen than elsewhere. Except in a few localities, field crops, orchards, and gardens are cultivated with the aid of irrigation systems, the water for which is taken from the mountain streams. Should the forests be destroyed, the streams, irrigation systems and crops would meet a similar fate.

In its present condition, the wooded portion of the watershed of our arid region receives the annual precipitation in the shape of snow and rain, and after sheltering this moisture from the evaporating influences of fierce sun and strong winds, gradually gives it up to feed the numerous springs and small rivulets which, united, form the larger streams bringing the water to points where it can be diverted for useful purposes. With the destruction of these forests will come the sudden freshets and rapid run-off of the moisture from the area, due to the lack of shelter from the sun's rays formerly provided by trees and brush, and without the construction of the enormous and expensive storage facilities to store this run-off until needed for irrigation, the water must go to waste and serve no beneficial purpose. The permanency of our water supply is, therefore, largely dependent upon the protection of forests at present covering our watershed, and this protection can only be secured by taking steps to prevent the devastating fires which annually sweep over large portions of the area.

Following the publication of that report a forest reserve was created by the government covering a large part of the timbered portion of the eastern slope of the Rocky mountains and foothill country in Alberta, and it was thought that a first step had been taken towards protection of the water supply and the establishment of the system of forest reserves so successfully carried out south of the international boundary.

Unfortunately, however, it was not long before the usual plaint of the lumberman and political exigencies resulted in the cancellation of the reserve, and to-day

practically nothing is being done to protect the forests on an area that is probably more intimately connected with agricultural development than any other equal area of forest in Canada.

This important matter is one which might well receive consideration at the hands of this important convention. It is certainly a matter which is most intimately connected with the agricultural development of a large section of the west as the following facts will indicate.

At the present time we have in Alberta and Western Saskatchewan the following irrigation development.

Canals and ditches constructed.	170
Length.	613 miles.
Acreage susceptible of irrigation from constructed canals and ditches.	733,362 acres.
Estimated cost.	\$3,500,000.

This statement only includes the 133 miles of canals so far constructed and the 110,000 acres of irrigable land therefrom in the large irrigation undertaking of the Canadian Pacific railway company east of Calgary, which will ultimately embrace at least 1,000 miles of canals irrigating 1,500,000 acres at a cost of some \$5,000,000, but it will serve to illustrate the importance of the question of preserving the forests which play so important a part in supplying the water of these canals and ditches, the successful operation of which must play an important part in the development of a large portion of that Greater Canada which is now attracting almost world wide attention.

Mr. WM. PEARCE.—I would desire to supplement to a slight extent the remarks of Mr. J. S. Dennis regarding the absolute necessity of conserving the forests of the foot-hills of the east slope of the Rocky mountains, also, whatever timber there may be on, or in the neighbourhood of, the Cypress Hills and Wood Mountain. As to the latter point I am not certain to what extent timber exists.

Mr. Pinchot, in his admirable address to the Convention on the forenoon of the 10th instant, struck the key-note when he said forest preservation, to be a success, must be a business proposition, mere sentiment will not sustain it.

It is to be noticed that the American Forestry Association combine, at least so far as its monthly publication is concerned, irrigation with forestry, the title of the journal being *Forestry and Irrigation*.

Those not familiar with the physical conditions regarding slopes, causing the rapid run-off of the foothills, cannot fully appreciate what the depletion of the timber thereon means in the way of destruction by flood. This might be probably well illustrated by what actually occurred in connection with Nose creek—a tributary of the Bow—in May, 1901. That stream enters the Bow from the north, just a short distance west of the 5th meridian. Its total drainage area does not probably exceed 100,000 acres. Its source does not materially, if at all, exceed 35 miles from its mouth. This stream under ordinary conditions has a discharge in ordinary floods varying from 25 to 40 second feet. On this occasion the discharge of this stream for some hours probably exceeded 3,000 second feet. This was caused by a heavy down-pour of rain falling on slopes on which there was neither timber or brush to impede the run-off. There was, however, a heavy growth of grass, and had it not been for that the run-off would have been much more rapid. Fancy a hundred such streams pouring into one river. It might be mentioned that in the big flood of June 17, 1897, it is assumed that the discharge of water of the Bow river at Calgary for some hours equalled

150,000 second feet. Up to that time it is assumed that the highest discharge of that stream, of which there are any indications, was about 40,000 second feet. If all its tributaries above Calgary had been denuded of the timber and brush along them the discharge of this flood would probably have been three or four times as great as it was, which would have turned the valley of the stream largely if not wholly into a gravel waste, with not a bridge or building left in same. It might be mentioned just here that all the timber on the foot-hill country would not pay for the bridges that would require to be constructed each year if the foothills were denuded of that timber. Further, under proper supervision, a much greater crop of timber could be obtained annually, than without such reservation and supervision is now obtained. Under the present working there will be in a very few years no timber for lumber—a good deal of it has considerable value for fencing material and settlers' sheds and stabling, but under proper management that supply could be increased. As for fuel, this reserve is not of very great moment, as the whole country that would be supplied by it is underlaid by coal, which is cheaply attainable. Further, in the matter of fence posts, it is probable that because of the production of Portland cement in this district in the very near future our fence posts will be largely made of that material, and that at a first cost very little exceeding that of timber.

It will thus, I think, be conceded that so far as the creation of this reservation is concerned, it certainly is a business proposition.

FIRES, BOTH TIMBER AND PRAIRIE.

If forest fires could be even largely prevented, and it is probable that under good supervision such results could be obtained, the great enemy to timber would be removed. If not wholly, the loss therefrom would be minimized. Not much has been said at this convention regarding the damage to timber done by prairie fires. The deforesting of probably fifty per cent of what are now the treeless plains of Manitoba and the territories has been caused wholly by them. If they were prevented, in ten years many parts of the prairie could not be recognized by reason of tree growth, of nature's sole furnishing. A mistaken leniency to those who have been guilty of setting out fires in the past is the cause of perhaps 85 per cent of the present fires. That this can be controlled one has but to consider what has been done in some cases by ordinary vigilance. Take the stretch of country lying for some distance south of High River and west of the Calgary and Edmonton railway, a district, the preservation of the grass in which was vital to the lives of several thousand cattle each winter. Owing to the care exercised by the owners of such stock, there has not been since 1882, one fire that covered 500 acres. These fires have been prevented wholly by care and watchfulness. Any one who would have, either through carelessness or wilfully, set out fire in this district, would have discovered that his life would have been a burden to him for some time.

The writer has been familiar with this district for upwards of twenty years, and he estimates that the effect of fires has been to deforest what would be equivalent to at least 300 square miles of foot-hill timber south of the Bow river. Some places the amount of prairie created by fire has been limited in breadth, and in others, to the extent of several miles in width.

If this timber be preserved so that the irrigation works can be extended to their fullest capacity, within a very few years there will be as great an area of timber created by the irrigation ditches and lying along same as it is desired should be preserved along the foot-hills, so that from that standpoint, the proposition is a business one.

We feel that we have but to direct attention to the actual condition in this vicinity to enlist your hearty co-operation. On behalf, therefore, of those interested in irrigation in the provinces of Alberta and Saskatchewan, permit me to thank the Honourable the Minister of Agriculture, for his very hearty advocacy of this reservation, and I feel certain that we have the equally hearty co-operation of the Right Honourable Sir Wilfrid Laurier, to whose inspiration this convention is due, and by whose aid and countenance its success will be most largely augmented.

THE RELATION BETWEEN WATER POWERS AND FORESTS.

CECIL B. SMITH, C.E., CHAIRMAN, TEMISKAMING RAILWAY COMMISSION.

Our president, Sir Wilfrid Laurier, in his opening address, placed many interesting topics for discussion before us; but the one which particularly appeals to me is the relation of the railway locomotive to the forest. Whether all the damage from fire attributed to the locomotive has been caused by it or not is difficult to determine, but all will agree that the damage has, in the aggregate, been very large and will continue to be so in the future, for locomotive screens unfortunately cannot be effective both in preventing the exit of sparks and at the same time permitting of adequate draught for heavy steaming. The role of a prophet is often a dangerous, and usually a thankless one, yet we must have our convictions and even enthusiasms, and, as a great writer has said: 'hitch our wagon to a star.'

I believe we are on the eve of a change. I believe that because of our enormous water power possibilities and of our relation to the coal mines, Canada should lead, not follow; and that in the near future we will have many of our railways, and particularly those in our northern forests, operated by electric locomotives, and, in my remarks on 'The Relations between Water Powers and Forests,' it should always be borne in mind that I have in view that one of the greatest uses to which water powers will in the future be devoted will be that of electric traction on our present steam railways.

Canada is well supplied with coal, both in its extreme eastern and western provinces, but over an area extending for three thousand miles from New Brunswick to the foot-hills of the Rockies, and from the United States boundary as far northward as we have knowledge of a definite nature, there are no coal measures of importance that have yet been discovered; and whilst this deficiency is not an absolutely vital one, yet it is of great economic importance, and has been a large factor in retarding manufacturing in this country.

Now that wood for fuel has become scarce and expensive in many localities, there is a double drain on the pockets of our people, and a continually increasing stream of money is flowing across our southern border to purchase coal for heating and power purposes.

Until quite recently this had not appeared very important because wood, being plentiful, was largely and often wastefully used for fuel and power, and because manu-



THE FOOTHILLS OF THE ROCKY MOUNTAINS.

facturing was not carried on extensively, and therefore the power problem did not loom large in the public view. However, the last ten years have worked many changes, and we are now face to face with a condition and not a theory.

Street and suburban railways are operated by electricity; cities and towns demand electric lighting; manufactures are increasing by leaps and bounds, and more and more coal continues to pour over our frontier to meet our ever growing demand for power.

The natural query is how and to what extent can this unfortunate economic condition be improved upon, and what is the proper channel through which the desired end can best be established?

The direct use of water power for pumping and grinding is embedded in history, and doubtless such uses will continue to form an important factor in daily life for generations to come; but, excepting in special cases, these uses will be and are, confined to water powers of small dimensions, and the service must be given in the immediate neighbourhood of the water power.

Quite recently, however, the transmission of electricity for considerable distances has been fully demonstrated to be feasible and economically important, and at once it became evident that water powers had assumed an increased market value by reason of the facility with which the power of water could be devoted to the generation of electrical energy, which energy could then be carried without serious loss or prohibitive expense, and in greater or less quantities to power markets and centres of population.

With the preceding statements postulated the natural question arises: To what extent are we blessed with water powers over this coal-less area, and how convenient are they to centres of population? Also, what has been accomplished to the present, and what is the future outlook?

If we study a map of Canada we find the area before referred to to consist, broadly speaking, of two drainage areas: one tributary to the Hudson sea, and the other to the St. Lawrence valley, the population of the country being chiefly centred in the latter area. Doubtless the Saskatchewan and Winnipeg rivers will soon become important from a power point of view; the former because of its relation to wheat grinding, the latter because of its nearness to Winnipeg; but looking at the St. Lawrence water shed, one is at once impressed by the great number of large rivers, flowing southward from the Height of Land, which all have excellent water-powers, and which, flowing as they do from wildernesses, full of swamps and lakes, are admirably uniform in their run-off, and liable to remain undisturbed for some time to come. The development of these powers is at present chiefly along the lines of milling and grinding, and only where situated near centres of population, such as Ottawa or Montreal, are they devoted to the generating of electricity.

Coming, however, to the rivers of that portion of Ontario south of the Ottawa river, a different and much less satisfactory condition prevails; and although in earlier generations, these rivers may have been quite steady in their flow, this is, with two or three exceptions, not now the case, owing to the great amount of cleared land and consequent rapid run-off of the flood waters, as soon as the spring thaws have taken place.

Before coming to the main subject of this paper, which is the relation between forestry and water powers, it may be interesting to dwell for a moment on the financial magnitude of the question under discussion. At the present time there has been developed in Canada about 350,000 horse power of water power, which probably, including transmission lines, represents an investment of \$25,000,000 to \$30,000,000, and considered only a ten-hour basis, means a saving of at least five tons of coal per horsepower-year, or 1,750,000 tons of coal per year as compared with about 6,000,000 tons annually imported. Now the near future will easily see this amount doubled or trebled if intelligent and comprehensive plans are adopted for development and distribution, and not only can a large amount of money be kept in our country, but industries and public utilities will be benefited by being supplied with electricity at reasonable rates.

Speaking generally, water powers are valuable in proportion to the amount of water available at the periods of low water, which usually occur in August and September, and in February and early March, and it is a matter of common observation that each river is a distinct study in itself, as the variables are not only numerous but largely beyond the control of man.

The chief features affecting the uniformity and total amount of flow are:—

(a) Drainage area, (b) shape of area, whether compact or narrow and long, (c) slope of country, (d) kind of soil, (e) rainfall, (f) evaporation, (g) condition of soil, whether cultivated, pasture, or woodland, (h) storage, natural or artificial, (i) control of run-off from storage.

It will be noted that all but the last three items are natural conditions, and therefore beyond the control of man.

However, the large water power developments which have been attempted to the present have been chiefly made on large rivers, and the pinch of low water has not been so serious as will be the case in the future when increased values will induce the development of smaller rivers to their fullest extent.

The practical problems of the control of river flow in the thickly settled parts of Ontario and Quebec provinces group themselves naturally into three districts, which will be treated separately.

(A) *Southwestern Ontario*.—In this district we have the Nottawasaga, Saugeen, Maitland, Ausable, Thames, Grand, Credit and Humber rivers, all possessing originally valuable water powers, but without any natural storage for the water, except in the soil, so that as this whole area has been practically (about 86 per cent) denuded of forests and given over to agriculture, the water powers have been nearly all ruined, and as the creation of artificial storage would be very expensive, and the country is too valuable as farm land to permit of it ever reverting to forest, little can be hoped for in the way of improvement, and the district will necessarily have to rely on Niagara as its chief source of electrical power.

(B) *Central Old Ontario*.—We find here an entirely different natural condition, and owing to this an exceptional opportunity presents itself for intelligent and comprehensive action which will, if carried out, be of great benefit to future generations.

The French, Maganatewan, Muskoka, Severn, Trent, Moira, Rideau, Mississippi, Madawaska, Bonnechere, Petawawa and Mattawa rivers with their sources in lakes and swamps all rise from a common plateau, largely unfit for cultivation, still chiefly

in forest, and much of it still in the hands of the Crown. They all possess excellent water-powers, many even now near to industrial centres, and up to the present time developed only to a very limited extent. Much of this central plateau is still in virgin forest, but much more has been cut or burnt over, and much partly cleared, on which thousands of families are eking out a meagre and precarious existence on land which would be much better occupied if devoted to the growth of another forest of pine and other trees indigenous to the region.

Those who have studied reforestation will be agreed that to re-forest on cleared land means close planting, as otherwise the trees form their limbs near the ground and become less valuable as timber. But to reforest a large area of cleared land in this manner would be beyond the means of a government, and therefore the idea suggests itself that the proper course to pursue would be to hold as it is at present, (and possibly even to re-forest some partly cleared or cut over districts), to limit the cutting of timber to ripe trees only, under Crown supervision; to replant from nurseries and guard from fires, and in connection therewith to gradually create a system of storages for water near the sources of the various rivers mentioned; lakes already exist in abundance; all that is needed is the construction of inexpensive dams to supplement those that have already been built by the Dominion government on the Trent canal, and elsewhere by lumbermen, and to place the control of the flow of water from these various reservoirs in the hands of proper parties, interested in making the most of the water powers dependent on these lakes for the uniformity of their supply of water.

The question involved in this district thus presents two phases: one, the improvement of water powers possessing wonderful natural storage, and amounting when developed to 200,000 or 300,000 horse power, Trent river alone 65,000 horse power, low water, 20,000 developed representing at least 1,500,000 tons of coal per year; and on the other hand the upbuilding of an extensive forest district naturally adapted to the growth of pine, but largely unfit for cultivation.

(C) *Southern Quebec*.—The Yamaska, St. Francis and Chaudière with other smaller rivers, have their sources in the foothills of the Notre Dame or White mountains, and possess valuable lake storage, and while this district is largely arable and fairly well cleared, there are considerable areas which it would pay to hold for all time as forest reserves in order to equalize the flow in the rivers above mentioned, and at the same time prepare valuable forests against the time when timber will be in still greater demand than it is at present.

Doubtless similar problems which exist in New Brunswick demand similar treatment, but unfortunately the sources of the St. John river are international in character, which complicates the problem, and the remaining rivers of the province are not supplied with extensive natural storage, and must depend on soil storage only. Holding the uplands of this province in forest seems essential to a preservation of its streams.

The relationship between stream flow and forests is an intimate one and in a country possessing valuable water powers, such as exist in almost every province of our Dominion, this must be continually borne in mind.

The problem is too vast to consider in any other way than as one of preserving our present forests, rather than in creating new ones, and if the far-reaching effect

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of such preservation is thought of in connection with the preservation and improvement of our water powers, an added incentive will be given to the natural desire to perpetuate for future generations our present valuable woodlands.

Fortunately the two interests are in harmony, and in preserving our forests, we can aid in developing to its fullest extent an equally valuable asset in our water-powers, which are to be found in every corner of the land.

NOTES ON FORESTRY AND A SHORT DESCRIPTION OF THE PRINCIPAL CONIFERS OF BRITISH COLUMBIA.

By J. R. ANDERSON, Deputy Minister of Agriculture for British Columbia.

(Read by Mr. E. G. Joly de Lotbinière.)

The suggestion of a member of this society that a general and simple description of our forest trees so as to serve the purpose of identification, would be useful and interesting, induced me to take up the subject of forestry in that connection. Now, whilst I think the suggestion a good one; especially if handled in an intelligent manner and with more competence than I feel that I am possessed of; I quite recognize the difficulty of dealing with it in such a manner as to render it of interest, and at the same time of sufficient originality, to make it of such a value as would entitle it to a place amongst the many able papers which have from time to time been read before the society.

I propose, therefore, in this short paper, to treat the subject in a general and discursive manner; avoiding in as far as possible, scientific terms, with a view of enhancing its interest, and possibly of making it of greater value to our members than if it were clothed in language which probably would be considered unintelligible by many, or if confined to any one division. Nevertheless, I wish to point out, that the so-called scientific names, whether applied to plants, or animals, are indispensable for their proper identification, and therefore it is impossible to avoid their use, be the subject treated in ever so simple a manner, so I trust I may be pardoned for obtruding names or terms which may appear pedantic, but which in reality are after all, the only real names; all vernacular names being more or less of a local character and therefore useless for general purposes.

Viewed from any standpoint, whether of utility, hygienic or climatic influences, romance, or as an adjunct to the beauty of the land, we find that forests and trees have occupied a foremost place amongst the thoughts of people from time immemorial, the value of trees still stands pre-eminent amongst the economic products of the earth, and forests have furnished themes for ages to poets who have sung their praises. We read of the groves devoted to the worship of the gods, the dilettante dreaming his hours away midst the leafy bowers, the trysts of lovers, and fairy dances in sylvan glades. Gifford Pinchot, the celebrated American authority on forestry, says:—

‘The forest is as beautiful as it is useful. The old fairy tales which spoke of it as a terrible place are wrong. No one can really know the forest without feeling the gentle influence of one of the kindest and strongest parts of nature. From every point of view it is one of the most helpful friends of men. Perhaps no other natural agent has done so much for the human race, and has been so recklessly used and so little understood.’

Apart from the economic value of the woods furnished by forests and their beauty from a sentimental standpoint, their influence on extremes in temperature, and protection against winds and water supply, are still important factors. Again quoting from Pinchot, he says: ‘The forest is the most highly organized portion of the vegetable world. It takes its importance less from the individual trees which help to form it than from the qualities which belong to it as a whole. Although

it is composed of trees, the forest is far more than a collection of trees standing in one place. It has a population of animals and plants peculiar to itself, a soil largely of its own making, and a climate different in many ways from that of the open country. Its influence upon the streams alone makes farming possible in many regions, and everywhere it tends to prevent floods and drought. It supplies fuel, one of the first necessities of life, and lumber, the raw material, without which cities, railroads, and all the great achievements of material progress would have been either long delayed or wholly impossible.' Wood enters into all our manufactures and structures in some form or other, whether in the actual construction or in the preparatory process, and in spite of the fact that metals have assumed an economic position in modern times of a magnitude and in a variety of ways undreamed of in previous ages, the various uses that are found for the products of the forest have so increased their consumption that even now the world is being confronted with the problem as to how the supply is to keep pace with the demand.

The supplies of wood in their natural state, inexhaustible as they appeared in this province, are being rapidly exhausted. We have a grand heritage in our noble forests, probably unequalled in magnificence and extent, in any part of the world, and it behooves us now, before it is too late, ere the devastating fire, or the insatiable lumberman has destroyed its pristine beauty, to use every effort to induce the proper authorities to make such provision as will insure to ourselves and to those who come after us at least a remnant of our magnificent forests. The alienation of the forests, one, if not the principal source, of our wealth, without due provision against waste and destruction, is certainly not in conformity with the recognized principles governing the conservation of forests so well ascertained by long years of experience in the older countries, even in the older portions of Canada and the United States.

I will now proceed to describe in a succinct and I trust intelligent manner, some of the features by which to distinguish the principal coniferous trees of the province and some of the uses to which they are put.

Douglas Fir, often called Oregon Pine and Red Fir, known botanically under various synonyms, that of *Pseudotsuga Douglasii* being the now generally recognized name of the principal commercial wood of the province. Growing in the open it begins branching out from the ground, the limbs attaining a great size and extending at the base to a distance in old trees of twenty to thirty feet all round. Such trees are commercially valueless but make fine shade and ornamental trees. The commercially valuable tree grows in dense forests attaining a size anywhere from six to eight feet and more in diameter and limbless for a hundred to one hundred and fifty feet.

The variableness of this tree owing to climatic causes, environment, and other conditions serves greatly to perplex the uninitiated. For instance in the old trees; growing in forests, the bark, scored in deep furrows, attains a thickness of from twelve to fourteen inches, whereas in the second growth trees, it is comparatively smooth, with an average thickness of one inch or thereabouts. Saplings or very young trees having cells of gum resembling those of Balsam are sometimes mistaken for the latter. In some cases the branchlets are long and pendulous and quite distinct in appearance from the typical form. I mention these facts for the purpose of directing attention to obvious differences which are most deceiving. The leaves are dark-green, short and set all round the stem, the cones are from two and a half to three and a half inches long and an inch and a half in diameter, easily distinguished by their peculiar scales. The wood in the old trees is close-grained yellowish-white, and of great strength. Its uses are legion; one of the latest being for inside finishing; when cut for the purpose, the beautiful grain is admirably displayed. Its range is pretty well all over the province, being found in the lowest parts, as well as on the highest mountains. It however, attains its greatest perfection to the westward of the coast range. On low rich land the growth is much quicker than on poor gravelly lands.

Cedar, or Red Cedar as it is commercially known in this province, is the White Cedar of botany—a name, like many others, utterly inappropriate—and must not be confounded with the Juniper which is called Red Cedar, nor with the White Cedar of the east, nor that of California, the former being *Thuja occidentalis* of botany (why *occidentalis* I do not know, as it does not occur in the west) and the latter *Libocedrus decurrens*. The botanical name of our tree is *Thuja gigantea* with several other synonyms. This is one of our most ornamental trees, growing to an enormous size, and when not too thickly surrounded by others, affording the best of shelter from the summer sun or winter storms. The wood is reddish with a strong odour, splits beautifully, is very ornamental and durable. Although soft, shingles are made altogether from this wood in this country and whilst it is intrinsically higher in price, it ranks next in commercial value to the Douglas fir. The leaves are a beautiful green, flat and graceful, resembling those of the Cedar of Libanon, the cones are very small and thickly set together on the upper side and at the ends of the branches. The deep shade formed by this tree in the forest reminds me of the words, by Mrs. Hemans, I think; entitled: 'The graves of a household,' where the grave of one is described as follows:—'The Indian knows his place of rest, far in the cedar shade.' The range of this tree is probably even greater than that of the Douglas Fir although it does not occur in such quantities. The natives used it almost entirely formerly wherever it was obtainable for constructing their canoes, houses, totem poles, arrows, &c. Boards for roofing which were first split and then hewn with stone adzes were made somewhat on the principle of roofing tiles, the two edges being raised on one side and in use were laid alternately one with the raised edges up, and the next reversed, thus forming a waterproof shed. These roofing boards were not so wide as those for the walls, being generally from two to three feet wide, whilst those for walls were any width up to five or six feet and even wider. As a matter of course, such property, on account of the immense labour involved in its manufacture, was of great value. Canoes made of this tree were sometimes of great size. One that I saw, was probably sixty feet long or more and the depth some six feet. From this, some idea may be formed of the immense size of the tree which was required to construct such a craft. In a bundle of split shingles sent to the World's Fair at Chicago every shingle was the width of the bundle. The bark is never very thick, rather roughened by scores running lengthwise. It peels easily when the sap is rising in the spring, at which season it was often stripped by the first settlers for roofing and walling outhouses and even dwellings, and for such purposes, when no other material is easily available, it is well adapted and lasts many years. The natives also made use of the bark of the cedar, not only in the same manner, but in various other ways in its rough state such as making baskets, bailers, &c. Prepared by separating the rough outside bark from the inner part and splitting the latter into strips, it is made into mats; pounded by an instrument of bone, the fibre so separated resembles oskum and it is spun into ropes, robes, petticoats, capes, and various other articles of apparel. It was also used for flattening the foreheads of children when the practice was in vogue; a pad being made of it fastened tightly across the unfortunate infant's head, and bound to its board cradle. Another use to which it was, and is put, is for gambling with round wooden discs, a number of which are concealed in a wad of cedar fibre and divided into two parts. The opposite player makes a guess and the discs are shaken out and rolled out on a mat. I am not sufficiently familiar with the game to describe it but I believe one of the discs is the king and wins. Besides the uses I have mentioned; bags, head-dresses and girdles for dancing, medicine men's paraphernalia and various articles were and are now sometimes made of cedar bark. The twigs and roots are also used in the construction of baskets, fish traps, strong ropes, also for stitching the seams and binding the thwarts to the sides of canoes. In fact the cedar entered more largely into the various requirements of the natives and was put to more economic uses by them than possibly any other native product, and it would require more time and space than I have at my disposal to describe more fully all the uses to which this useful tree was put.

Yellow cedar, so called, really Yellow Cypress, known botanically as *Thuja excelsa*, with two other synonyms, is confined in its range to the mountains of the islands and those of the lower mainland in the southern part of the province but extending to the sea-coast in the north. In the interior of the island it occurs in large quantities and extends to the snow line, it, however, does not grow to a great size hereabouts but it attains its greatest perfection in the north where it is reported to sometimes exceed six feet in diameter. The nearest point to Victoria that I have ever seen any specimens growing is on the Nanaimo river where there are several fair sized trees. It is also found on Mt. Benson near Nanaimo, and at other similar altitudes. The graceful pendent branchlets serve to distinguish it at once from the red cedar previously mentioned, the cones are small, about the size of a large pea, round, and compact, borne plentifully at the ends of the branches. The wood is close-grained, quite yellow, with a strong, but rather pleasant odour, which it is said is objectionable to insects; it is easily worked and when polished resembles box wood. The Indians in the north make canoes of the wood, it is also used by them extensively for paddles and for carvings, the close grain lending itself admirably for the latter purpose. For inside finishing, fine cabinet work, and similar purposes it will certainly take a front rank in the future. It is also reported to be extremely durable for ship building, the natural crooks making excellent knees for such purposes. The bark is of a fine brown colour and is quite smooth, presenting none of the characteristic roughness of the previous tree.

Spruce, Western Spruce or Menzies Spruce, known botanically as *Picea sitchensis*, with several other synonyms. The range of this fine tree is all over the littoral of the mainland and islands, extending to the northern boundary of the province. On the west coast of Vancouver island and to the northward on the mainland it in a great measure replaces the Douglas fir near the sea, the latter receding to the higher lands. Its habitat is essentially in the lower and more humid parts so that few or no specimens are to be seen near Victoria. It attains great size, one specimen I remember measured fifteen feet in diameter at the base. It however does not carry its size like the Douglas fir and the branches, even when growing in dense forests, occur much nearer the base than in the case of the former. When growing in the open, it is unquestionably one of the most stately of our conifers; the limbs which are strong and rigid, starting out near the base, the ends touching the ground on all sides, diminish regularly in size so that the tree presents a perfect pyramid and forms a shelter through which no ordinary rain will penetrate. Although the growing tree exudes a great deal of gum, the wood, which is white, light, and pliable, is entirely free of resin, and is extensively used in the construction of pleasure boats, oars, fruit boxes, &c. The branchlets and roots are used by the Indians in making baskets and for other similar purposes. The leaves are short, about the same length as those of the Douglas fir, and like those of that tree, thickly set round the branch, they are of a dark bluish-green colour, very rigid and prickly. I know of no better material for making a bed in camp provided it is covered over with other material. The young ends are the material which is used in making spruce beer, with which probably most of us have at some time or other been familiar. About the end of May the staminate flowers appear, resembling large strawberries, of a rich crimson colour, which gradually elongate and after a time set free quantities of pollen so that in a high wind the surrounding air is filled with the yellow dust. This phenomenon has given rise to a belief, which is quite widespread, that it is sulphur which has been set free by electric storms. The cones are quite loose generally in clusters of three or four, about three inches long, and one wide. The bark is thin and scaly, the round scales often falling to the ground and covering it thickly at the base of the tree.

Englemann's spruce known botanically as *Picea Englemanni* resembles the last in many respects, it does not attain as great a size and the cones are much smaller, still it grows to four feet or more in diameter and from 100 to 150 feet high. Its growth also is not so spreading as Menzies spruce covering much smaller spaces of ground. Its

habitat is not so restricted to wet sections as the former, and its range, the interior plateau and eastern part of the province. The foliage is a sombre dark green much resembling its eastern confrere, the white spruce, in that respect. The leaves are shorter than those of Menzies spruce, very rigid but not so prickly. The cones are also smaller, from one and a half to two inches in length, and three quarters to an inch in width.

Hemlock is the rather puzzling name that a tree which grows very commonly throughout the province is known by. Why it is called by that name, I cannot say, hemlock proper being a very poisonous deciduous plant belonging to the natural order of *Umbelliferae* and therefore to the uninitiated, the name, as applied to a large tree, is naturally most perplexing. The tree is known botanically as *Tsuga Mertensiana*, with half a dozen synonyms. It grows to a large size, often in dense forests, with no undergrowth. The roots being near the surface, often only covered with moss near the trunk, this tree is peculiarly liable to destruction from forest fires. The leaves resemble those of the Yew, being short, flat, and placed on each side of the stem, having an odour, not unpleasing, but peculiar, and by which it is easily distinguished. The cones are small; not more than three-quarters of an inch long, and placed numerously near the ends of the branches. The terminal branches and tops being slender and drooping it is probably the most graceful of our many handsome conifers and deserves a place in any arboretum. The only use to which any part of this tree is at present put, is the bark for tanning, for which purpose it is well adapted. The bark is never very thick, one inch and at most an inch and a half, it is of a dark grayish-brown colour finely divided by shallow scores longitudinally and often horizontally, and in that respect closely resembles the Western White Pine; so much so, that one has often to look up at the foliage to ascertain the species. The wood is good for inside work but does not last well exposed to the weather near the ground. It is heavy, light coloured, close grained, and will probably get into general use for many purposes when the other woods get scarce. The range of this tree equals that of the Douglas fir and in many places quite supersedes it.

Mountain hemlock, so called by me, to distinguish it from the last, is known botanically as *Tsuga Pattoniana*. In appearance it differs greatly from its prototype, being rigid and ungraceful. Its thick impenetrable foliage would naturally lead one to the belief that it would form an excellent shelter from rain, but such is not the case, as I have found to my cost when caught in bad weather on mountain tops. This is due to the fact that the branches slant towards the trunk, and the water therefore does not run off. The habitat of this tree is on high mountains, where it grows in a stunted form right up to the snow line. The slow growth of trees at that altitude is shown by the rings in the specimen; which you see is only about nine inches in diameter; is about two hundred years old. The leaves are similar to the last, but often, especially on the higher altitudes, growing all round the stems in close rigid clusters and the cones altogether larger, from one and one-half inches to two inches long. The characteristic odour of the hemlock is preserved in this species, but is more pronounced and pungent.

The Western White Fir or balsam fir is another common tree in that part of the province to the westward of the coast range, it is known botanically as *Abies grandis*, and as is usual with our conifers, has several synonyms. It is well designated, as it is indeed a grand tree, but too stiff and formal to be quite pleasing. It is called balsam fir on account of the large quantity of gum contained in cells on the bark of the young trees. The leaves, about an inch long, of a fine dark glossy green, are flat, and placed on each side of the stem; the cones are about the size of those of the Douglas fir, but much more compact in their immature state, and more fragile, falling to pieces as soon as they attain maturity. The bark on young trees is smooth and covered thickly with the gum cells previously spoken of, but as the tree attains age, it gets rougher, but still comparatively smooth, and of a light brown colour seldom over an inch in

thickness. A strong, pungent, but agreeable odour, distinguishes this from all the other coniferous trees of the province. It grows principally on the lower lands where it attains a great size. The wood which is white, light, odourless, and free of resin, is not used commercially, but it would no doubt make excellent boxes for fruit. As it decays quickly, it is not a suitable wood for outside work, and on account of its lightness and lack of density, it is almost useless for firewood. Its range is general throughout the region mentioned, but it does not occur in as great quantities as Douglas fir, cedar and hemlock.

Mountain balsam (*Abies subalpina*) is the prototype of the last. This too occurs on the high mountains of the island and mainland attaining in some places quite a large size. It resembles the former in many respects, and the wood, equally with the other, is not generally used. The bark, even on an old tree, is quite smooth and light coloured, often almost white. The leaves, as is usual with alpine species, more rigid, not so regular in their manner of growth, sometimes growing all round the stems, and the odour as is also usual with alpine conifers, very strong, pungent, and rather overpowering. The cones very conspicuous and sticky, occur in clusters, standing upright, and are, when immature, of a dark purple colour, turning to a brown as they attain maturity, when, as is the case with the other species, they become fragile and easily fall to pieces when handled. The size is from two and a half to three inches in length, and about one and a half inches in thickness.

Larch or tamarack, known botanically as *Larix occidentalis*, does not occur to my knowledge to the westward of the coast range. It is, however, one of the principal woods of the upper country, where in some places, large areas of fine trees are to be found. The timber from this tree is much esteemed, and justly so, for its excellent qualities. The tree, whilst very handsome in foliage, will never, in my opinion, be a favourite for ornamental purposes on account of its peculiarity in shedding its leaves in winter. Its tassel-like delicate light green clusters of leaves and the peculiar little knobs along the branches out of which they spring renders the tree very easy of identification. The cones are quite small, about an inch in length, crimson when in flower, and resemble those of the mountain hemlock. A peculiarity of this tree, is, that two varieties of gum are exuded. The ordinary resinous gum peculiar to all conifers, and a mucilaginous gum which exudes from wounds caused by fire, resembling gum arabic, and of a rich amber or dark brown colour. The natives esteem this gum very highly and burn the trees so as to cause it to exude. The bark, of a reddish brown colour, is generally quite smooth and slightly seamed with light scores.

Western white pine is the common name of *Pinus monticola*, with several synonyms amongst which we find *Pinus strobus* var. *monticola*. *Pinus strobus* is the white pine of the east, so well known in commerce in the manufacture of doors, window-sashes and like purposes. Our white pine resembles it in many respects, but in my opinion is a much grander tree, growing to a height in the forest of 150 to 200 feet; the leaves in sheaths of five, from three to four inches long, are a peculiar light bluish-green, making a fine contrast with other conifers; the pendulous cones, borne on the tops of the trees, and therefore difficult to obtain, attain a length of six to twelve inches, giving a very unique appearance to the tree; the bark which is somewhat in appearance like that of the hemlock, splits into small square plates, is of a pale brownish colour, and often exudes large quantities of gum. The wood, however, is free of resin. It is white, light and easily worked, resembling the eastern variety in that respect and in odour. It is probably the most valuable of any of our woods, but unfortunately it does not occur in any great quantities. The product, I am informed, is bought up principally for the manufacture of powder barrels and boxes, for which purpose it seems to be particularly adapted. Its habitat is on mountain ranges and at altitudes of three thousand feet or thereabouts, and its range is general throughout the province; at any rate in the southern portions; but I am not aware of its northern range.

Yellow pine, also locally called bull pine, the botanical name of which is *Pinus ponderosa*, so called, I believe, from its large cones; it is also called *Pinus resinosa*, both appropriate names, as it exudes large quantities of gum through its bark and at the ends of the branches. This tree is confined in its range to the plateau between the Rocky mountains and coast range; that is, in the dry belt of the interior; where, in some places, it is found in large quantities in the valleys and extending some distance up the mountain sides. It is a very handsome tree, tropical in appearance, the leaves in threes, being from six to nine inches long, and of a fine dark green colour. The cones are large, about four inches long and three wide, borne singly or in twos, threes and even fours, close to the stem and near the ends of the branches. Before the cones mature they are very solid and compact; at maturity, the scales open and the seed is an article of food amongst the natives of the interior who gather it in large quantities and after the wings are separated store it away for winter use. In taste they are like a filbert, or a hazel nut, and resemble the pine nuts of California. The bark is red and smooth with scores running lengthwise and is generally from one inch to one and a half inches thick. The tree does not attain any great height, 125 feet being possibly the average, and the diameter from two to four feet. Growing as it does in comparatively open forests, or singly, there is not any great length of trunk which is limbless. It is the principal wood used for lumber in many parts of the interior, and whilst its quality does not compare favourably with most of the coast woods it nevertheless is of great value in those regions where better woods are scarce. It is good for inside finishing and rustic, but it is not at all adapted to heavy work, such as bridges. The odour is particularly agreeable and pervades the whole atmosphere when it grows in quantities.

Scrub pine, also called, erroneously, Jack pine; the latter name being more particularly that of an eastern variety. The botanical name is *Pinus contorta*, a name given it on account of its gnarled and stunted growth when growing on exposed rocks and points. It, however, becomes quite a tree when occurring in more favourable localities and growing in forests. It seldom, however, attains any size, a foot to eighteen inches or at most two feet being the limit; six to ten inches are much more common. It is a stiff growing and not at all a pleasing tree; the leaves, in pairs, are from two to three inches in length, of a dark green colour; the cones are small, about an inch in diameter, nearly round, very hard and closely adhering to the branches, the bark is rough and dark, quite thin and generally covered over with gum. It is singular in its habits, occurring as it does on dry sandy or gravelly wastes, exposed points of rocks, dry hill sides, swamps on the tops of mountains, and on low delta lands. It seldom grows with other trees but generally in groves or singly. The wood is not used for any purpose, but I am informed that it makes good charcoal; rather an exceptional quality in a coniferous tree.

Black Pine botanically known as *Pinus Murrayana* is to all intents and purposes identical with the last. I have always held this belief, and I am supported in it by such a celebrated authority as Professor C. S. Sargent of the Arnold Arboretum, Harvard University, who says of it, in a letter to myself: 'It seems to me that *Pinus Murrayana* must be considered a variety of *Pinus contorta*, the two intergrading in a perfectly hopeless manner.' The description I have given of *Pinus contorta* answers for this one. It occurs in large quantities on some of the lower mountains in the Rockies, Selkirk and others; in some places growing in dense forests, where it becomes a valuable wood for mining purposes and buildings, the trees growing straight and limbless, except at the tops; they are, however, seldom over a foot in diameter and from sixty to one hundred feet high.

Juniper or Pencil Wood. *Juniperus occidentalis* is found pretty well all over the province in exposed points, generally growing in a stunted form, but occasionally attaining a size on Vancouver island, of from two to four feet, but seldom over a foot.

The leaves are a grayish green, resembling the cedar, with a strong pungent odour. The berries are blue, covered with a white bloom. This is a dioecious tree; that is, the individuals being of different sexes, like the holly. The wood is fine grained, red, with the well known perfume of the pencil wood. Some years ago I was applied to from England as to the possible supply of this wood in this country, as the sources from which it was obtained were being exhausted. I regret to say that I was unable to report favourably as it does not occur in sufficient quantities in any one place. As it is only required in lengths of about seven inches and cut to the thickness of pencils it may prove remunerative to any one entering into the business, even under present conditions.

Yew, known botanically as *Taxus brevifolia*, is a small tree occasionally attaining a size of two feet, and forty feet in height. Its habitat is principally along the sea coast of Vancouver island, and mainland; generally, in thickets of other trees. The leaves are short, about an inch, flat and placed on each side of the stem, closely resembling the hemlock; the fruit is a pretty red berry about the size of a pea with a peculiar hollow at the calyx; the bark is smooth and reddish, and the wood is very dense, hard, heavy, and of a fine red colour. Like our own forefathers, the Indians were well aware of the suitability of this wood, and when they were in use, made their bows of it. It closely resembles the European variety but is not identically the same. For rollers and such purposes this wood is excellent.

In conclusion let me again call your attention to the fact that no forest reservations have been or are being made. I have, whenever opportunity offered, urged the reservation of a tract of country embracing forest, stream, lake or mountain, unsurpassed in Canada, I think I may safely say without fear of successful contradiction, for beauty, magnificence and variety. I now allude to that tract on the headwaters of the Qualicum river, Cameron lake and river, Mt. Arrowsmith and the adjacent forests. I have on a previous occasion alluded to the question, and I now ask that some action be taken to induce our representatives to take it up in earnest with the view of re-acquiring the rights which have been alienated and setting apart a suitable tract as a national park for all time for the use of the public. I allude to the particular area in question not only on account of its natural beauty, but for the reason that it is easily reached by a good wagon road both from the east and west coasts, and therefore peculiarly well situated for the purpose.

MORNING SESSION.

THURSDAY, January 11, 1906.

The secretary read a telegram from His Honour Sir Henri Joly de Lotbinière, Lieutenant-Governor of British Columbia, conveying best wishes for the success of the convention, which was received with applause.

FORESTRY ON THE EXPERIMENTAL FARMS.

WM. SAUNDERS, LL.D., DIRECTOR OF EXPERIMENTAL FARMS.

Some attention has been given to experimental forestry at each of the Dominion experimental farms ever since their organization, and at most of the farms a sufficient area of land has been devoted to this purpose to permit of some satisfactory work being done.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

At the Central Farm at Ottawa this work was begun in 1888 on two blocks or belts of land set aside for this purpose, comprising about twenty acres in all. One of these, of 165 feet in width, extends across the west margin of the farm; the other, 65 feet wide, runs the whole length of the north side of the farm—the length of these belts being about a mile and a half in all.

On the wider block about half of the trees have been planted 5 feet by 5 feet apart, and on the other half 10 feet by 10. They have been put out in clumps or blocks of a single species arranged so that each variety occupies a part of the closer as well as a part of the wider planting.

On the narrower block the plantation is a mixed one throughout, and part of the trees are planted 5 feet by 10, and part of them 5 feet by 5.

The objects in view in this work were:—

1. To test by experiment with a number of different species the comparative results in growth and development to be had by planting at these different distances.

2. To gain information on the relative growth which trees make in this climate when planted in blocks of a single species, as compared with those planted in mixed groups where a number of different species are associated together in an irregular manner.

3. Information was also sought as to how far the crops on the farm located near these tree belts would be influenced by the shelter which the trees would give as growth progressed.

In the planting, the groups were also arranged with the object of producing pleasing effects on the landscape at different seasons of the year, by the partial intermingling of varieties, especially of the conifers with deciduous trees. The main purpose, however, was to get all the useful data possible with regard to the more important timber trees of economic value, so that object lessons in tree growth might be available to those who should in future desire to study the subject or to engage in the enterprise of timber growing.

The work of planting was begun in 1888 and completed in 1893, and since that date has been under the care of Mr. W. T. Macoun, horticulturist of the Central Farm. The number of trees planted was about 20,000 in all, the main part of the space being given to twenty-one species. These were planted on different kinds of soil, selecting, as far as this could be done, the soils thought to be most suitable in each case. The ground was kept cultivated with a horse cultivator as long as this was necessary to keep down grass and weeds; but when the trees had grown sufficiently to form a dense shade, such growth was prevented and further cultivation was not needed. The trees planted ten feet apart needed cultivation for several years longer than those put out five feet apart and some of the lighter foliaged trees did not afford the degree of shade required to smother the undergrowth as soon as in the case of the denser growing sorts.

The following is a list of the trees under test:—

- Black Walnut (*Juglans nigra*).
- Butternut (*Juglans cinerea*).
- Silver-leaved Maple (*Acer dasycarpum*).
- Sugar Maple (*Acer saccharinum*).
- European White Birch (*Betula alba*).
- Canoe Birch (*Betula papyrifera*).
- Yellow Birch (*Betula lutea*).
- White Elm (*Ulmus americana*).
- Black Ash (*Fraxinus sambucifolia*).
- Green Ash (*Fraxinus viridis*).
- Red Ash (*Fraxinus pubescens*).
- White Ash (*Fraxinus americana*).
- Black Cherry (*Prunus serotina*).

Box Elder (*Acer Negundo*).
White Pine (*Pinus strobus*).
Scotch Pine (*Pinus sylvestris*).
Austrian Pine (*Pinus austriaca*).
White Spruce (*Picea alba*).
Norway Spruce (*Picea excelsa*).
American Arbor-vitae (*Thuja occidentalis*).
European Larch (*Larix europaea*).

Every year measurements are taken of three or four average specimens in each group of the annual growth in height and in diameter of trunk, $4\frac{1}{2}$ feet from the ground, and every two or three years a table is published in the annual report of the experimental farms giving the particulars of growth. Such a table was first published in 1897 and again in 1899, 1901 and 1904. Some of the varieties of trees have not had congenial soil and have not made as much growth in the belts as others of the same species planted later in soil better adapted to the needs of the tree. As the white pine is, without doubt, the most valuable of all our timber trees, two clumps of this species were planted on a light sandy soil and both have done well. Mr. Macoun has furnished me with the measurements he has taken this year of the trees in this group. The young trees, when first planted, were from 8 to 10 inches high and two or three years old, and the average height now in that part of the clump planted 5 feet by 5 feet is 30 feet 2 inches, and the average diameter $4\frac{1}{2}$ inches, measured $4\frac{1}{2}$ feet from the ground. The trees planted 10 feet by 10 have not grown quite so tall, but the trunks are larger in diameter. They average 28 feet 11 inches in height and $6\frac{3}{8}$ inches in diameter. Similar particulars regarding the other sorts of trees tested, giving their growth up to the end of 1904, will be found in the annual report for that year. I have had an average specimen of this species cut from about the middle of the closely planted section 5 feet by 5, and have it here, so that you may see the character of the growth. The section I now call your attention to was made a short distance above the base of this tree, where the calibre of the trunk is fairly uniform. The specimen was planted in 1889, sixteen years ago, and you will see that it has sixteen annual rings of wood growth and the section measures 6 inches in diameter. By examining the width of the annual rings of wood, it will be seen that the growth has been fairly even from year to year, and in regard to the lengthening of the tree the annual growth has been good.

Among other measurements made of tree growth here, the following may be noted: A white pine growing as a single tree, in the *Arboretum*, of the same age as those in the forest belt, is 25 feet high and measures $9\frac{1}{2}$ inches in the trunk $4\frac{1}{2}$ feet from the ground. A white spruce planted on the mixed belt in 1890 is now 32 feet high and measures $5\frac{3}{4}$ inches in diameter of trunk $4\frac{1}{2}$ feet from the ground. In many instances the trees growing in the mixed belt have produced more timber than those in the clump planted with one species.

During the first few years after the establishment of the experimental farms, most of the trees and tree seeds sent to settlers in the North-west were forwarded from the Central Farm at Ottawa. In 1890, 131,600 young trees were sent to the North-west in packages containing 100 trees each, and in 1891, 200,000 were distributed in a similar way—the trees being all sent out in response to individual applications. During the year 1891, 4,053 1-lb. bags of tree seeds (box elder and green ash) were also sent to applicants in Manitoba and the North-west Territories. During the next three years a large number of additional seedling trees were sent out, with over 1,500 1-lb. bags of tree seeds. Prior to the establishment of the experimental farms very little had been done in the North-west country in the way of tree planting; but as soon as it became known that trees and tree seeds were available which would be hardy and reliable, applications came in in large numbers.

Since 1893 arrangements have been made to supply settlers in Manitoba, as far as practicable, with young forest trees and tree seeds from the experimental farm at Brandon, Man., and those residing in the Territories from the farm at Indian Head,

Sask. Many applications, however, from that part of the country continue to come in to the central farm for tree seeds and to meet this demand about 300 lbs. are sent annually to Ottawa from the supply collected at Brandon and Indian Head. The total number of trees sent out to settlers from the central farm since its establishment is about 600,000. About 10,000 lbs. of tree seeds have also been distributed from here within the same period.

EXPERIMENTAL FARM AT NAPPAN, N.S.

At the experimental farm at Nappan, experiments in tree growing have had less attention. So large a proportion of the country in Nova Scotia and New Brunswick is still in forest that public attention has not been much aroused to the importance of gaining information relating to tree growth. Some small groups of useful timber trees have been planted and their growth noted.

EXPERIMENTAL FARM AT BRANDON, MANITOBA.

The need for forest shelter on the open prairies in the north-west country has been severely felt, and special attention has been given to this subject on the experimental farm for Manitoba at Brandon, also on that established for the North-west Territories at Indian Head, Sask.

The site for the Brandon farm was selected during the summer of 1888, and tree planting there was begun in the spring of 1889. About 20,000 trees, consisting of a large number of varieties, were sent that year and about 12,000 more the year following. Extensive preparations were made for the growing of trees from seed, especially the native species which could be relied on for hardiness, and a large number of seedlings of Box Elder, Green Ash and Elm were raised for further planting on the farm, in windbreaks, avenues and shelter belts, and also for distribution among farmers. The Brandon farm is situated partly in the valley of the Assiniboine river and partly on the bluffs which form the boundary of that valley, with occasional trees near the river, and open treeless country above, on the bluffs. In the ravines on the rising ground on the face of the bluffs there are large patches of scrubby growth, consisting of small poplars, scrub oak, hazel, cornus, eleagnus and other low-growing bushes. In the shelter provided by this scrub growth, small blocks and fields of land were broken up and cultivated and they have served a useful purpose for testing small fruits, shrubs and flowers and other things requiring partial protection. Hedge enclosures have also been planted which have proved similarly useful. Besides producing trees for shelter in the different forms found most useful on the Brandon farm, involving the planting of about 70,000 trees, a large number of seedling trees have been distributed from year to year, by mail, to farmers who have applied from all parts of Manitoba for them. The packages sent out usually contain about 1000 young trees each, sufficient to form a small plantation about the settler's home as a beginning. The total number of young trees thus sent out from the Brandon farm from the time of its establishment to the present is about 870,000. A large quantity of the seeds of native trees has also been sent to farmers on application. The latter are distributed in packages either of a pound or half a pound each, and the Brandon farm has sent out in all 3,300 pounds.

EXPERIMENTAL FARM AT INDIAN HEAD, SASK.

When this farm was selected in 1887 it was all bare prairie land, without a tree or shrub to break the monotony of the landscape as far as the eye could see. In 1888, 20,000 young forest trees were sent there; 15,000 more in 1889; and another 15,000 in 1890. Further supplies have also been forwarded from season to season for many years. Large quantities were also raised from seeds and cuttings, which were either planted on the Indian Head farm or distributed to farmers throughout the Terri-

tories. From the time of the establishment of the Indian Head farm to the present, about 510,000 of such young trees have been sent out by mail to applicants, in bundles of 100 each, and 7,073 1-lb. bags of tree seeds.

The planting at Indian Head has produced a great change in the appearance of that farm. From a bare prairie section it has been transformed into one quite well wooded. Shelter belts 100 feet wide extend for nearly two miles along the boundaries and afford protection on the west and north sides of the farm, while large clumps of trees protect the buildings and adjacent crops from injury by winds. The farm is laid out in large blocks, divided by roadways which afford access to all parts of the land. These are bounded by avenues of trees, which extend for many miles. Hedge enclosures, where over two hundred varieties of trees and shrubs are being successfully grown. An arboretum has been established in the shelter of one of these inclosures, where over two hundred varieties of trees and shrubs are being successfully grown. Several of these inclosures are planted as orchards, where many sorts of hardy crabs and cross-bred apples are being tested to find out which are most suited to the climate. Many tree hedges have also been planted along each side of the roadways, especially in some of the more exposed positions. These completely shade and shelter the roads and extend their protecting influence to the adjacent crops. When bad wind storms prevail it has been found that for every foot in height of these sheltering windbreaks about fifty feet of crop has been protected. Thus a hedge twenty feet high has protected a crop for about one thousand feet, thus establishing the great value of these shelters. The number of trees required to complete the planting of the farm has been about 125,000.

Putting the plantations of the central and two north-western farms together, the trees used for this purpose number about 220,000; while the total number of trees distributed among settlers in the Canadian North-west since 1889 is about two millions, and the quantity of tree seeds about 21,000 pounds, or 10½ tons. As each pound of this tree seed with reasonable care may be expected to produce 500 to 800 seedlings, it is not surprising that the results of this work are now everywhere apparent. On homesteads in almost every part of the North-west country, there are plantations of forest trees thus obtained which now furnish shelter for the growing of garden vegetables, small fruits and flowers, also for buildings and stock, and at the same time, make the dwellings of the settlers more attractive and home-like.

Since experience has shown that the box elder, or Manitoba maple, the species which has been largely used in this work, begins to produce seed when the trees are about six or seven years old, a large proportion of the earlier distributed trees must ere this have reached a seed-bearing age. As the number of seed-bearing trees increases, large and constantly increasing quantities of seed will be available and convenient for all, and thus an enormous impetus will be given to tree growing throughout the north-west plains.

In addition to the direct distribution of trees and tree seeds from the Western experimental farms, they have been able also to materially aid the Forestry Branch of the Department of the Interior in the larger distribution of trees now being made by that useful branch of the public service established some years ago. At each farm from ten to twenty acres of land has been placed at the disposal of the Forestry Branch since 1901, and on this area the larger part of the trees required for their work has been grown. Now, with plenty of well-prepared land on their own tree farm, their work can be done more conveniently.

Thus the good work goes on and the acreage devoted to tree growing increases from year to year.

EXPERIMENTAL FARM AT AGASSIZ, B.C.

A few words must be devoted to the experiments in tree planting which have been conducted at the Agassiz farm. Here we have a considerable area of mountain land and, on the slopes of the sides of these mountains, a large amount of planting has been

done. A belt of timber has also been planted in the valley. The planting on the sides of the mountain has only been partially successful. Many thousand trees have been planted, especially of the hardwoods of the east, such as hickory, oaks, walnut, &c.; but most of these have been smothered by the heavy growth of bracken every year on this part of the farm. This fern grows to a height varying from five to ten feet and the shade which the foliage of these plants affords shuts out the light from the young trees, thus preventing their growth. Many young trees, however, have struggled through and forced their way up through the ferns, and, once permanently in the sunlight, their growth has been rapid. The trees growing in the forest belt in the valley have done remarkably well. These were planted ten feet by ten feet apart. Some recent measurements of trees lately sent me by the Superintendent at Agassiz, Mr. Thos. A. Sharpe, are surprising. Young white pines, two years old, planted thirteen years ago, have now reached a height of 30 to 31 feet, and a diameter of trunk three feet from the ground, of $8\frac{1}{2}$ to 11 inches. Shellbark hickory, twelve years planted, with trees four years from seed, now have a height of about 20 feet, with a diameter of trunk, three feet from the base, of $6\frac{1}{4}$ inches. Black walnut, trees two years old when planted, now fifteen years planted, are 35 feet high and have a diameter of trunk, three feet from the ground, of $12\frac{1}{2}$ inches. White oak, 13 years planted, 31 feet high, diameter of trunk 8 inches. Black cherry, 13 years planted, diameter of trunk $7\frac{1}{2}$ inches. American elm, 13 years planted, 38 feet high, trunk 14 inches in diameter. Hard maple, 13 years planted, 29 feet high, trunk $5\frac{1}{2}$ inches in diameter.

These results are, I think, very encouraging and point to the practicability of growing with much success, in British Columbia, a number of the most valuable of the timber trees of the east at a more rapid rate of growth than has been obtained here.

FARM FORESTRY IN THE EASTERN PROVINCES.

REV. A. E. BURKE, ALBERTON, P.E.I.

There can be no phase of forestry, which fortunately is beginning to receive somewhat of the great attention which it deserves from the central authority, as essential to the general prosperity of the country as well as productive of direct influence on the conservation of its great water sources, the health of its people and the beauty and charm of life amongst us—nothing so eminently practical in its effect on the greatest number of our population—as farm forestry. The farmer in the more fortunate wood-growing divisions of Canada has only within a comparatively short time awakened to the value of trees not only as a source of fuel supply—and fuel will always be a heavy charge against farm revenue—and the lumber which is always a requisite about the place, but as a temperer of the adverse winds, a protector of the fruit plantation, the pasturing cattle, the dwellers on the steading themselves; and as a source of beauty and comfort beyond anything else we can name.

Having to contend with the great forest at settlement, it is not wonderful that it was considered by the average pioneer an enemy; and, therefore, to be removed at the earliest possible moment. Even where wood and wood products were little sought, the torch and axe were in requisition until all the acres of the holding were for the most part bare and treeless. This did not so much matter where the misguided operator was somewhat isolated, but when all the land became occupied and a general policy of destruction was adopted, the effect was signally adverse to the productiveness of the lands and the comfort of the land holders. In the large provinces even, areas which would constitute states in smaller and less favoured countries were thus stripped; in the smaller provinces the dire results of such a short-sighted policy became more and more of an affliction. The new additions to the older provinces formed a magnificent reserve and afforded all the timber supply necessary for local requirements; the older sections began to find out the error of complete denudation; the public mind became awakened and informed to sane principles; and early an attempt to retrieve lost ground was



TWELVE-YEAR-OLD ELMS, PLANTED 3' x 3' ON BRANDON EXPERIMENTAL FARM.

discernible. That disposition to help themselves on the part of the people has actuated the government of Ontario in the generous and organized system of reafforestation, educational and practical, which it is now pursuing. Quebec still has its great forests, but the settled portions are, in many cases, bare of trees. It has no such systematic policy as to forestry as its great sister province; but the farmer there, too, is alive at last to the advantages of the wood-lot, and will henceforward compel an enlightened policy not only with regard to the maintenance of the proper proportion of field and forest of his own locality, but also, since it affects him and the people generally, a conservative administration of the great forests of the province.

In Maritime Canada there is still much to be done. The three Atlantic provinces, smaller than the others as they are, and, therefore, divided and weakened in the effort which the times so imperatively demand in the way of forestry, can scarcely be said to have given this question the consideration it deserves.

Apart from Prince Edward Island, agriculture has not been the exclusive occupation of their people. Nova Scotia is a large mineral province and the development of these riches has occupied her attention almost entirely. Out of thirteen millions of acres scarcely one million is given up exclusively to agriculture, and except in the alluvial stretches which form her rich fodder fields, the land has not been in any locality so completely denuded as to threaten the failure or adversely affect the growing capacity of her cultivated fields. An economic timber policy is greatly to be desired, however, and this will very beneficially affect not only the cultivated areas of to-day, but those which to-morrow may, in the needs of greater production, be subjected to the plough.

New Brunswick is a well-wooded province of seventeen million of acres, only a very small portion of which is given over to agriculture. The growing of timber for the money that is in it has been always a commercial pursuit of the people although no systematic forestry has ever been inaugurated. A great portion of the lands still remain under the Crown. Some ten millions of acres are granted lands, it is true, but even those are practically half under forest of some kind. Certainly less than five millions of acres are devoted to crop production; and, so far as we know, no organized system of farm forestry has yet been demanded or evolved. Of the seven and a half millions under the Crown possibly six and a quarter are under timber license and the remainder burnt or barren areas. In the farming sections the errors of other places are apparent. The wood has been cleared away and in many cases whole portions of country bared of trees to the great disadvantage of successful agriculture. New Brunswick, while not under present circumstances vindicating to itself the title of an agricultural province, is nevertheless susceptible of successful field culture much more generally than has at all been attempted and quite as much if not more so than countries which are freely accorded an agricultural name. Professor Johnston, F.R.S.E., who examined the province carefully, reports that its soil is capable of producing food for five or six millions of people; capable of growing all the common crops on which man and beast depend; and possessing a climate suitable for the growing of crops in quantity and quality not inferior to the average soils of England. It is, therefore, greatly to be desired that, as agriculture must play a great part in the development of this province when the population of the country becomes intensified, as we know it will in the not too distant future, a sane system of forest preservation be early resorted to, so that the fruitfulness of the future crop-producing areas may not be radically impaired.

The third and most generally fertile province of Maritime Canada, termed by its admirers, 'The Garden of the Gulf' and 'the Million Acre Farm,' has already suffered and is suffering very considerably every year from the deprivation of its forest. The lands for the most part have passed from the Crown—only about fourteen thousand acres out of one million two hundred and eighty thousand acres, are still in its possession, and those lands have long ago been stripped of everything worth taking away. The farmers themselves are, in the great majority of cases, obliged to purchase coal for fuel from the mines of the neighbouring province of Nova Scotia, and building

material from the New Brunswick mills. The farms thus bared are not all being cultivated to their utmost; the island is susceptible of maintaining under right conditions a system of the most intensive agriculture, and one which would sustain in comfort a population five times greater than its present one. The portions cultivated—and they are much greater than those of the other maritime provinces, comparatively greater than any other portion of Canada—comparatively fruitful as they are, would be doubly so if the requisite forest influences were in full play. There are numerous places completely denuded which nature only intended for tree production, and the safeguarding of the splendid water sources with which the province was originally endowed. One thought given to the insular nature of the country, its situation in the midst of a great wind-swept gulf and its smallness, will convince any one that the losses incurred by husbandry, where unprotected from the blizzards of winter and the drying-out winds of summer, as well as the erosion which spring freshets and fall rains occasion, must be very serious indeed.

Little more than one hundred years have sufficed to transform this province from a complete forest to its present bare and exposed condition. Then its flora was of the most engaging to be met with in the western hemisphere, comprising a large area of coniferous and deciduous trees, among them those mentioned by the intrepid explorer, Jacques Cartier, when on July 1, 1435, he first trod Canadian soil in the island province. His 'Relations' contain an admiring mention of our beautiful forest trees, and in it he enumerates with great exactness the fir, the black, red and white spruce, the stately hemlock, the white and red pine, the larch and the cedar, and the maple in four varieties; the white, black, yellow and canoe birch; the wide-spreading beech, the elm, the ash in variety, the oak, the aspen, the cherry and many other inferior species. The axe, the torch, man's cupidity and the utter disregard of the governing power have swept away this precious heritage.

Within recent years we have come to recognize our sorry plight; we have aroused the public conscience; we have attempted to quicken the provincial authorities to some action which may save us from further loss, and start us out on the way of retrieval. A commission was appointed to examine into the case a few years ago, and whilst their report may have little technical value it has by sounding the alarm at least manifested to the apathetic farmer a condition of things he otherwise might never have realized, to wit, that forest growth is essential in most situations, at all events, as a protection to the farm from the chilling winds which sweep over the gulf and adversely affect all life upon the island in winter, resulting often in many of the dread diseases which come from exposure to such temperature, and increasing to an extent unknown in the old days, when the country was tree clad, the scourge of consumption, the Great White Plague, now a general menace.

Forest protection is necessary to the farm lands so that water can penetrate the soil and be available for crop production. If the whole farm area is deprived of the advantages which the forest floor affords for the conservation of the water precipitated, the exposed soil hardened by the tramping of cattle and the patter of raindrops must shed it superficially if it is anyway compact. As a consequence these waters are not only lost to crop production, but gathering into rivulets, carry great quantities of the rich soil with them as well as furrowing the fields with gullies and runs. This carries away valuable plant food, covers the lowlands with silt, damages the roads, and swelling the water courses causes them to break their bounds and dissipate the water, which by subterranean channels should feed them later. In Canada to-day it is estimated that not less than two hundred miles of fertile soil are washed into rivers and brooks annually, and those who examine the public accounts will be surprised at the immense sums of money expended each season in digging out those lost farms from the harbours and rivers of the Dominion. Many thousands of dollars' worth of crops and other property are destroyed by overflows and floods, and many more by droughts which one province or another suffers yearly—all or nearly all of which would be avoided if the water supply of the country were properly regulated, and the conservation and management of the forest is the only agency available to this end.

The tempering effect of the forest on the farm need only be mentioned. By modifying the velocity and temperature of strong winds a great reduction is brought about in the protected fields. We plant wind-breaks about our orchards and out-buildings to secure shelter and thus temper the hot winds of summer and the cold blasts of winter. An extension of this system to the fields would greatly increase the yield in crops. The increased moisture which forest protection affords because of the decreased evaporative power of the winds, the velocity of which has been reduced by passing through forest, is very considerable. It is estimated that a foot in height of forest growth will protect one rod in distance, and a succession of tree plantations would very materially increase this protective power. The forest tempers the farm, too, by preventing deep freezing of the soil and shortening the cold winter.

Whether or not the forest may increase the water fall over the adjacent area is still a question open to discussion, but no one doubts that by transpiration the moisture near forests is greatly increased and vegetation thus beneficially affected. But even if no increase is admitted in the rainfall because of forest influences the availability of whatever does fall is greatly increased by a forest growth properly located. In forests the water percolates through the soil most thoroughly, and the snow fall is caught by them and melted so gradually as to be subject to little waste. Larger amounts of water are, therefore, held by the forest soil and sink deeper into it than into that of the open fields. The sun and wind, the great moisture-dissipating agents, not having full play in the forest, the conservation of moisture is much easier than elsewhere. The water supply available in the soil is thus increased 50 per cent scientists tell us. Increased percolation and decreased evaporation afford large quantities of moisture to feed the springs and sub-soil waters, and these are finally made available to the growing crops in times of extreme drought.

The forest as well as watering, tempering and protecting the farm supplies it with much useful and valuable material. Those who have to purchase coal at big prices know how it eats into the year's revenues. Once established the wood-lot, properly handled, will reproduce itself and supply in reasonable proportions not only the fuel, but much of the timber and lumber required in the up-keep and extension of farm construction. The poorest portion of the farm, that unfit for tillage, may thus be made to bring in the best returns. On a well regulated farm of one hundred acres 25 per cent should be left in forest. In harvesting, the openings should not be made so large at any time in this wood-lot as not to be easily re-seeded from the adjacent trees.

The forest will not only benefit the farm and add to its value in all the ways we have been describing, but it will so beautify it as to make life doubly pleasurable to those upon it, and also to the community in which it is placed. 'A thing of beauty is a joy for ever'—and what so beautiful as a thrifty tree in the open, a line of trees by the roadside, a clump of trees in some waste corner, a well kept grove or wind-break sheltering the farm buildings, or a wood-lot lifting its head high to the sky in conscious pride of its worth on the rear line of the holding? The value of that farm, if by any necessity it has to be put on the market, is greatly enhanced by such adornment and the extra cost of it has been little or nothing to the farmer when everything is computed. Nay, it has paid him a hundred fold, bettering and blessing his life.

'Nature is man's best teacher. She unfolds
Her treasures to his search, unseals his eye,
Illumes his mind, and purifies his heart,
An influence breathes from all the sights and sounds
Of her existence.'—*Street*.

The question comes naturally to every lip: 'How are we to restore in sections impaired the proportion of forest to field, how maintain it where it exists at present? How are we to bring about in eastern Canada a sane system of farm forestry?' To our mind a general forestry policy should be quickly and effectually evolved by the central authority, not only with regard to the new countries under its control where the mistakes of older Canada must not be repeated, but also in the older portions where

the national life has been adversely affected by the dangers with which the sacrifice of the forest have menaced it in its economic, agronomic, climatic, hygienic and aesthetic relations. As with agriculture even where the provinces have supreme control, a paternal policy productive of the best results has been long adopted federally, by which educational and practical assistance has been bestowed, so in the forestic endeavour the presence of the instructor and the bestowal of stock wherewith to re-plant may be necessary. The farmer can thus be taught the value of his wood-lot at comparatively little expense to the country, and the result in prosperity and national happiness will far outreach the returns, great as they have been, in any other line of agricultural effort. A fully equipped federal department looking to the maintenance and necessary extension of forestry in every portion of Canada is the necessity of the hour. Let us hope then, that in the general impetus which this council must give to this great national interest, farm forestry in eastern Canada will not be overlooked.

TREE PLANTING ON THE PRAIRIES OF CANADA.

NORMAN M. ROSS, ASSISTANT SUPERINTENDENT OF FORESTRY FOR CANADA.

The prairie districts in Canada are included in the province of Manitoba and the new provinces of Saskatchewan and Alberta—a territory measuring roughly 900 miles east and west by 250 miles north and south. It must not be supposed, however, that the whole of this immense territory is entirely destitute of timber or wood lands. On the contrary, in northern Manitoba, Saskatchewan and Alberta there are considerable areas well stocked with timber containing merchantable spruce, tamarac and jack pine; and though this timber might possibly not be considered large from the standpoint of the eastern lumberman, still considerable quantities of lumber, fence posts and ties for local use are produced. In the report of the Dominion Statistician on the Forest Wealth of Canada, published in 1895, Manitoba is stated to have 40 per cent of its territory in woodlands, and the territory, now divided into the provinces of Saskatchewan and Alberta, about 43 per cent. Even in the southern part of Manitoba the open country is frequently interrupted by bluffs of native broad-leaf trees, principally aspen poplar and balm of gilead. In places too we even find whole townships well wooded with these poplars in mixture with green ash, Manitoba maple, scrub oak, American elm, white birch and willow. It is not until we get west from Winnipeg about 350 miles on the main line of the Canadian Pacific railway that the true, open prairies are reached. From Regina west to the foothills of the Rockies, a distance of about 500 miles, one can travel along the main line of the railway without seeing a single tree or bush of natural growth, with the exception of an odd cottonwood, maple or willow in some river or creek bottom.

It would be interesting to know the actual causes for the present lack of forest growth over this vast territory. There is sufficient evidence to lead to the supposition that at least very large portions, if not the entire area, were at one time timbered. Fires have undoubtedly played a large part in keeping down tree growth, and once the old stand is destroyed in this way the natural conditions are not particularly favourable to a second growth. The very richness of the soil is against natural reproduction, encouraging as it does the rapid formation of a thick sod wherever the ground is exposed to the sunlight; and once the grasses get a foothold there is little chance for a struggling tree seedling when the next prairie fire runs over the ground. The rainfall varying according to the season and district from 20 inches to as low as 10 inches; the elevation, running from about 800 feet at Winnipeg to nearly 3,500 at Calgary; the extraordinarily strong wind storms and extremes of temperature, are other conditions affecting tree growth in anything but a favourable way.

The advantages, both to the individual and the country as a whole, to be derived from the cultivation of trees in the prairie districts are so evident that it seems hardly necessary to enumerate them.

The average soil throughout the prairie provinces is undoubtedly the richest for agricultural purposes in the world and holds out great inducements to the home-seeker. The scarcity of timber, however, making as it does building material, fencing and fuel exceptionally expensive, and the lack of shelter in a country where the climate is at times so rigorous, undoubtedly deters many from starting new homes under such conditions. The most immediate need the settler has at present is shelter, as a protection for his buildings and his stock, and to enable him to successfully cultivate certain fruits, vegetables and tender crops, and to beautify his home with shrubs and flowers. The utter bareness and cheerlessness of the average prairie homestead during the winter months, which could so easily be improved with a small expenditure for planting, cannot be realized by those who have not had an opportunity of visiting the west during that season.

The possibility of growing trees successfully and profitably on the prairies is no longer a matter for speculation. For several years after the commencement of settlement, owing to repeated failures due to the use of tender varieties and the improper methods of cultivation employed, tree planting was looked upon by the average farmer simply as a means of wasting so much time and labour. This opinion was fairly general even to within six or seven years ago. Now, however, thanks to the perseverance of a few individuals and more especially to the work of the western experimental farms along this line, it has been demonstrated beyond doubt that for plantations to be successful in the west, all that is needed is to follow out certain methods of cultivation and to select the hardy varieties, rendered necessary by the natural conditions of the country. The experimental farms have done most valuable work during the past eighteen years in testing large numbers of nearly all varieties which might possibly prove hardy, so that there is no excuse for failure on this account, as we now have a comparatively long list of varieties which we know to be perfectly adapted to western conditions. The experimental farms have also demonstrated most effectually the possibility of growing shelter belts and the great benefits which they afford to the neighbouring crops. Even though rainfall is slight the average soil of the prairie is so rich that tree growth under cultivation is very rapid. Very little of the land in the settled districts can be classed as non-agricultural and it would not do to advocate that the planting of trees be restricted to such soils. Indeed, judging from the plantations on the experimental farms and elsewhere, it seems undoubtedly the fact that a larger revenue could be obtained, say in 20 or a less number of years, from land capable of producing good crops of wheat, by planting this up with trees than could be expected under the present system of farming. This is not so difficult to realize when we take into consideration the high prices paid for fuel and fence poles, and also remember that under the present system of summer fallowing, now followed generally in the wheat growing districts, the land produces a crop only twice in three years, or three times in four years. Up to the present, planting has not been done extensively enough, nor yet are there any plantations of much over 15 or 20 years of age, from which can be obtained any reliable data bearing on the profitable side of tree culture; though from what I have seen of tree growth in the west, I have, personally, no doubt that a farmer could scarcely make a more profitable investment than by setting aside and planting to trees 10 to 20 acres of his lands. Profits from wheat, however, come quickly and unless actual figures can be obtained to back up the proposition it will be hard to induce the western farmer to plant with the, to him, uncertain possibility of obtaining a return in from 15 to 20 years. But planting for shelter purposes is now becoming very general and it will be a matter of only a few years before the fact that trees will produce a good paying crop is accepted by all.

At the present time one of the factors which as much as anything else unfavourably influences the planting of trees to any extent by the settlers is the lack of cheap nursery stock of suitable varieties in any considerable quantities.

At present the varieties almost universally planted are the native maple or box elder, native green ash, American elm, cottonwood, Russian poplar and willow.

These are all good varieties and of value in certain localities and for certain purposes ; but the ideal tree for shelter is an evergreen. Throughout the prairies the white spruce is perfectly hardy, also the jack pine. The native tamarac too is a tree which will, in my opinion, prove exceptionally profitable ; yet I think I am safe in saying that at present it would be impossible to obtain, in the west, nursery grown stock of either of these varieties, at a price which a farmer could afford, in sufficient numbers to set out even an acre of shelter belt or plantation.

Ever since the opening up of the west to settlement, the Government has realized the great need of encouraging tree planting, but to within a few years progress in this respect has not been particularly rapid. The first scheme adopted was similar to the Tree Claim Act in force in the western states some years ago, whereby a settler could obtain title to a certain amount of land by planting a few acres of it to trees. The regulations governing the methods of planting and the ease with which many of these regulations could be avoided, made it easy for settlers to obtain possession of the land without any satisfactory results in the desired direction. Consequently a few years later the Act granting these tree claims was withdrawn. When the experimental farms were organized, actual demonstrations were commenced at the western stations as well as a distribution of seed and seedlings in small quantities with information on tree culture to the settlers. The principal work of the Experimental farms is of course in conducting experiments connected with the ordinary farm crops, stock and horticulture. The time and money, therefore, which can be devoted to tree culture and to the general encouragement of planting throughout the west is necessarily very small and quite inadequate when we consider the immense territory and the great numbers of settlers pouring into the country who, for the most part, are totally ignorant of western conditions and particularly of the ordinary factors affecting tree growth.

In the spring of 1901, soon after its establishment, the Forestry Branch organized a co-operative system, with a view to encouraging general tree planting throughout the prairie districts on a more extensive scale than had been done up to that time. The chief feature of this scheme is the free distribution of considerable numbers of seedlings of native western forest trees. It was realized that unless this was done no amount of advice or instruction could in itself induce any general movement in favour of a more extensive system of tree planting. As before mentioned, the very lack of cheap plant material has been one of the chief hindrances, making it almost impossible for a farmer dependent upon commercial nurseries for his stock to set out more than a few hundred trees at the most. Such a distribution as is now made by the Forestry Branch is necessarily carried on under comparatively strict regulations which insure the proper care and planting of the seedlings and the ultimate success of any plantation set out under the system.

Under these regulations any settler desirous of setting out a windbreak or plantation is required to send in his application a year previous to that in which the planting is to be done. He is then sent instructions as to the cultivation required to prepare his ground for the trees, and some time during the summer he is personally visited by an inspector of the department, who sees for himself whether the ground is suitably worked and gives the applicant further instructions as to methods of planting, the general lay out of the plantation and the best arrangement of the trees. In reporting to the office he sends in a rough sketch of the proposed plantation and recommends the varieties of trees best adapted to the local conditions. The applicant signs an agreement to the effect that he will plant the trees, cultivate them and protect them from stock and fire under instructions furnished by the Forestry Branch. Only as many trees are given to each applicant in one season as in the opinion of the inspector can be properly looked after. If, in following years, additional trees are wanted they are supplied when possible, but not where those previously planted have in any way been neglected.

This co-operative scheme has now been in operation for five seasons and the results obtained have almost exceeded the anticipations of the department, and are

most encouraging to those employed in this branch of the work. In order to show most readily the increasing popularity of this scheme in the west and the great influence it must have in encouraging a more general interest in tree planting, I will give the numbers of trees and cuttings sent out by the Forestry Branch of the Interior Department up to the present time :—

In 1901..	58,000
" 1902..	468,000
" 1903..	920,000
" 1904..	1,800,000
" 1905..	2,000,000

and there are, in the nurseries, at the present time, ready for distribution next spring something over 2,100,000 ; so that after next spring's distribution there will have been sent out by this branch a total of 7,347,700 seedlings and cuttings, besides considerable quantities of maple and ash seed ; roughly speaking, a sufficient amount of material to plant up, according to our system of setting trees, four feet apart each way, an area of over 2,700 acres. This area compared to the total area of the Northwest is very small, but it is made up of plantations varying from one-half to perhaps 15 acres in size, scattered all over the prairie regions at present under settlement. The great value of these plantations does not lie in the actual returns that could be at present or in the future obtained from them so much as in their educational value. Each plantation, no matter how small, is an object lesson to the surrounding neighbourhood, demonstrating the possibility of successful tree culture where proper methods of cultivation are employed.

In order to supply the large number of seedlings required for this work, the Forestry Branch has established a nursery station at Indian Head in Saskatchewan, containing 160 acres where practically all the nursery stock, with the exception of cottonwood, to be distributed, will be grown. The Dakota cottonwood is a tree of very rapid growth on the prairies and suitable for pioneer planting in most districts. Seedlings of this tree can be imported from the western States, where large numbers are obtained growing on the sand bars of the rivers, much more cheaply than they can be raised in a nursery. This, however, is the only variety distributed which is not grown in the Forestry Branch nurseries. Besides growing nursery stock at this station, it is intended also to set out several test plantations from which reliable data can in the future be obtained as to cost of establishment, maintenance and yields. Work will also be done in the cultivation of varieties not yet fully tested and more particular attention will be given to the raising and planting of the hardy conifers.

As soon as the work of the Forestry Branch becomes more fully developed considerable planting will, no doubt, be done on many of the western forest reserves. Experiments on a very small scale were started in 1904, and continued last spring, in planting Scotch pine on the very sandy soil of the Spruce Woods reserve, east of Brandon, in the province of Manitoba. The results, so far, are encouraging, and planting will be continued next spring. In this reserve there are several townships composed of light sandy soil, unfitted for agricultural purposes and scatteringly wooded with white spruce and the low spots with tamarac and black spruce, and can only prove of value for the production of coniferous timber.

In the future, undoubtedly, the most extensive planting operations will be carried on by the government in the forest reserves. The railways will also plant up comparatively large tracts to tamarac, jack pine and perhaps Scotch pine for the production of ties. At present the cost of transportation is very great and the sources from which ties can be obtained are gradually diminishing, which facts are forcing some of the western lines to very seriously consider the question of growing their own supply.

Planting by the private individual will not be done on any large scale unless in exceptional cases. Such planting will be limited to the cultivation of shelter belts

and perhaps a few acres for fencing and fuel. If, however, every settler does his share, the prairies will very soon present a different appearance and the resulting benefit to the general welfare and comfort can hardly be overestimated.

THE AGRICULTURAL FOREST PROBLEM.

E. J. ZAVITZ, FORESTER, ONTARIO AGRICULTURAL COLLEGE.

The subject of forestry is being brought before the general public in newspaper and magazine articles as never before in the history of the country. The efforts of the Canadian Forestry Association, the general rise in wood prices and the wonderful development of the forestry movement in the United States has done much to awaken the people of Canada.

Forestry and agriculture have very much in common as food crops and wood crops both depend upon a rational treatment of the soil. During the last century agriculture has developed from the crude and wasteful exploitation of the soil to an art based upon scientific principles. That which we call forestry to-day can well be compared to the agricultural efforts of our forefathers as they scratched the soil with wooden ploughs and paid little attention to the future uses of the land.

When the early settlers of the province arrived along the shores of our great lakes the forest seemed an impenetrable barrier. We scarcely realize in these days of agitation for forest conservation what an enemy these pioneers found in the heavy forest which covered the soil. Without modern appliances they had to clear the land and it is not to be wondered at, that any and every means was taken to get rid of the trees. However, our forefathers wrought nobly and we have no quarrel with the past. In these days of settlement the tree that would split the easiest was taken so that we find such material as black walnut and white oak being made into rails or going into heaps for burning in the clearing operations. However, it is surprising to find in these days a lack of knowledge as to the value of certain trees. Last summer I found a farmer clearing up the last remnant of his woodlot and everything was going into cord-wood. Among other valuable trees was found some black cherry trees from fifteen to eighteen inches in diameter. There was a mill and market within eight miles, but the owner did not know wood values and the main object was to clear up the land. Clearing of land is inherent. Our fathers and forefathers had to do it to make a living so we have followed in line and do it without questioning the reason or the future of the land denuded.

Popular articles are frequently written stating how much and why certain percentages of forest should exist throughout an agricultural country. We cannot lay down any arbitrary figure nor is it necessary to say what percentage of the land should be covered with trees. Successful cultivation of the soil is being carried on in districts where there is scarcely any forest cover.

In an agricultural country such as Ontario there are three reasons frequently advanced why forestry should be practised. Aesthetic effects, protective influences and financial investment are all given as arguments why certain portions of the land should be wooded.

While the aesthetic argument may appear very weak to many, there is no one but will admit that a treeless waste would be a poor country in which to live.

Woodlands as a means of protection are of great interest to the agriculturist. Houses on the farm protected by the trees require less heating in the winter. Stock in protected barns and barnyards undoubtedly require less food.

Beneficial effects to field crops may also be of great importance. A field of wheat or clover protected by woodlands or protection belts will have a great advantage over the unprotected field. Snow falling on the protected field gives a mantle which shields from sudden changes and lessens the danger from frost. In the spring the snow is taken off by evaporation caused by wind and sun. We frequently forget that the

wind is a great factor in causing the quick disappearance of the snow. If a mantle of snow can be kept on a field of clover a few days longer in the spring during the sudden changes of temperature it may be of great benefit to the crop.

We are not able to say definitely of what value the melting snows of spring are to field crops or to the soil, but there is little doubt that a wind-swept field loses a great deal of moisture that should be taken up by the soil if better protected.

Woodlands on the banks and at the headwaters of streams will better regulate the flow of water as well as protect the banks from serious erosion.

As fruit growing develops in Ontario it will be found that protection from wind is very necessary to the soil and also to the tree, especially while it is burdened with fruit.

It is also probable that the moisture content of the soil is greatly influenced by the winds which sweep over the surface of unprotected fields during the dry periods of the summer.

We sometimes hear the argument that this is an agricultural country and it will not pay to devote land to the growing of wood crops. It is interesting to note that in 1896 we had 13 per cent of waste land in the older agricultural part of the provinces. The topography of the country is such that it can never all be utilized for food crop production. When we still find large amounts of waste land in an old country like Great Britain adapted to forestry purposes it is not likely that agriculture will become so intensive in Ontario that we shall require all the land for food crops.

A large percentage of the remaining woodlots of Ontario which are on first-class soil should yield nearly one cord per acre per annum under proper management. However, putting the annual increment at two-thirds of a cord, which at a fuel-wood price of \$6 per cord would give a great rental of \$4 per acre, this compares very favourably with agriculture, for the average annual rental of farm land in Ontario is \$2.49. The town forest of Winterthur has produced \$10 per acre per annum for the last thirty years and there are Saxon forest ranges of spruce which yield an annual net revenue of \$12 to \$15 per acre. We frequently hear the statement that we cannot apply intensive forestry methods such as are applied in Germany where wood prices guarantee investment in forestry undertakings. In 1900, the average price of work wood for Prussia, was about 10 cents per cubic foot and for fuel wood about 3½ cents per cubic foot. Work wood or lumber quality as we might term it in our country was \$17 per thousand and fuel wood \$3 per cord. Indeed we are in some cases paying higher prices for fuel in Ontario than is being paid in Germany.

In agricultural districts where we enjoy immunity from fire surely forestry investments should be looked upon with favour.

The great majority of forest or woodland owners in this country are farmers. It is possible to carry on intensive forestry management on the wood lands connected with the farm. The farmer can do many things in the care and development of his woodlot which would be impossible in the case of larger holdings where every outlay has to be charged up against the crop. He has horses and outfit. Part of his operations can be carried on in the slack season. He can easily be taught silvicultural facts as he has already a knowledge of the soil in its relation to vegetable life. He is owner, manager, swamper and chopper combined and is in a position to carry out a rational plan of management. While it is true that their woodlot holdings are in small parcels yet it may be interesting to know what it means in the aggregate. 'Old Ontario,' lying south of the 46th parallel of latitude is known as an agricultural country and contains about 33,000 square miles. Allowing ten per cent of this to be covered with wood land and we would have in private hands 3,300 square miles or over two million acres. Within this area many species find the northern limit of their original distribution. Such valuable hardwood as black walnut, shag bark hickory, sweet chestnut and tulip or white wood were originally found only in the most southerly portions of the province. White ash, red and white oak, black cherry, rock elm and other valuable species are found throughout this older portion of the province. Our northern forests are coniferous and we cannot depend upon the north for a supply of cabinet

and finishing woods. True the yellow birch of the north woods has a high value as a finishing or cabinet wood, but the commercial interests of southern Ontario to-day depend upon a foreign market for the great bulk of its hardwood supply.

White oak, black walnut, chestnut, white ash, whitewood, hickory, &c., which are native to old Ontario are being imported by the various manufacturers. From the forestry report of 1884, over twenty years ago, I quote the following extract from a Toronto lumberman's letter. 'White ash, butternut and white oak are also becoming woods of the past. We rioted in the abundance of our forest wealth and are now suffering somewhat of the evils attendant on such a course. To-day we import whitewood and walnut from places to which formerly we exported large quantities of the same timber, much superior to what they are now bringing in.'

We are using poorer qualities where once only first grades would have been looked at. Species such as soft elm are being used to-day for purposes where twenty years ago they would have been considered valueless. In 1884 a Toronto firm offered \$8 to \$9 for soft elm loaded on the car at point of shipment. Last week I find the same species, probably not as good quality, selling for \$8 per thousand on the stump and for \$12 per thousand in the log at the mill. In the same year the same firm offers \$18 to \$20 per M. for white oak loaded on the car at point of shipment. To-day white oak is selling at \$30 per M. on the stump.

The writer does not hold that the wood lands of Ontario can be brought to an average or productive capacity so that the manufacturers could depend on the local supply. Indeed, I believe Ontario must go on importing white oak, hickory, &c., so long as the American market can supply us. However, we hear persistent rumours of a timber famine across the line and there is a probability that we shall see the day when it will be very hard to obtain our present supply from that source.

The people of Ontario will have to be satisfied with a poorer quality and will have to get along with poorer species where we are now using more valuable ones.

However, the question that affects the wood land owner in the southern part of Ontario is that high prices will prevail for certain hardwoods and frequently very fancy prices may be realized. But some one says that the small woodlot cannot profitably produce timber sizes and that its management must be confined to the production of fuel and smaller sizes. This is partially true, but in a selection method of cutting, such as the small owner will likely follow, there is room for a certain percentage of trees of timber size,

The small land owner or farmer is interested in two classes of land, in relation to forestry. The farm wood-lot and the waste portions of the farm. There is considerable written in agricultural journals concerning the usefulness of the wood-lot to the farmer. The wood-lot or bush as it is frequently called in Ontario is the result of no particular plan in its relation to the economy of the farm. It just happened. The land was gradually cleared and it is what was left over, being usually at the end of the farm. Wood-lots can be found in almost all stages and conditions. I occasionally find one in the old settled parts of Ontario having the condition of the original forest. In Durham county I examined a wood-lot in which it was claimed a tree had never been cut and the owner used to be considered a crank on this point. No doubt he was a crank, and timber has gone to waste that could have been utilized to the advantage of the remainder of the stand. However, the usual condition of the wood-lot is at the other extreme and both extremes are wrong for silvicultural and economic reasons.

Estimates of the percentage of remaining wood lands in Ontario are frequently made and are of interest in this connection. The following figures are based upon the township assessment returns to the Bureau of Industries and are for the counties of the older part of Ontario. These figures must necessarily be somewhat inaccurate, but they have considerable value and interest. In 1884 there was reported for this part of Ontario 32 per cent of wood land, in 1894, 23 per cent, and in 1904, 15.6 per cent. In 1896 there was for the forty-three counties of old Ontario 18 per cent of wood land and 13 per cent of waste land with eleven counties having less than 10 per cent, and forty-four townships having less than 5 per cent of wood land. When stating that these

figures must be to a certain extent inaccurate I would like to draw attention to certain relations where errors probably exist. The township assessor is told by the owner that he has twenty acres of wood land. What does this twenty acres represent? There may be twenty acres fenced off, but perhaps two-thirds is wood land and the rest slash. This last year an attempt has been made to overcome this error and a division has been made between wood land and slash. Taking the county of Lambton we get some interesting figures. In 1904 the assessment gives this county 136,000 acres or 20 per cent of wood land. Last year we find from the assessment returns that Lambton only had 61,000 acres of wood land or only about 10 per cent while the rest of the reported wood land for 1904 have gone in as slash. One township in Welland county whose local conditions I am well acquainted with gives twelve acres as slash, which is a ridiculous figure. There is little doubt but that our percentage of wood land is far below 15·6 per cent as given for 1904.

It will pay on the average farm to keep and improve the present wood-lot as a permanent investment. The fact that farm land annual rental for Ontario is \$2.49 per acre is a good argument, for it can be easily shown that such soil for wood crop production can be made to give as good if not better rental. It is also probably true that in the settled parts of the province the individual farmer has as much land cleared as can be properly cultivated and managed.

The average wood-lot has no definite boundary but has become very much thinned out on the borders by wind and cutting. Defective and overmature trees are taking up valuable space and suppressing new growth. Inferior species have been given the advantage owing to the cutting of the more valuable ones. Gaps have been allowed to develop into large openings which have become so filled with grass and weeds that new growth cannot start. Grazing has been allowed so that reproduction could not take place and it is needless to say that stock must be kept out if proper growth is desired. Time will not allow a detailed silvicultural description of the condition and needs of the Ontario wood-lot. Neither would it be possible to give such a description, as each individual case requires its own treatment.

However, general suggestions may be given and there is little doubt but that our intelligent farmers will become careful silviculturists as they come to realize the importance of the woodlands as a part of the farm. The wood-lot first of all should be given a definite boundary and this boundary should have a coniferous belt or hedge of trees. In this way the woods as a whole would more nearly approach forest conditions which is not the case in hardwood stands of small area. Defective and overmature trees should be gradually removed. Gaps and open spaces should be filled with young growth either by planting or dibbling in nut seeds. The relation between coppice and sprout growth and that of seedling origin should be better understood. Operations such as these can be carried on by the farmer at a very low cost, and will give definite results.

The second class of land which is related to forestry is the waste portions of the farm. Steep hill sides, sandy or gravelly fields, rocky formations and swamp lands could be planted with trees so as to become a source of revenue rather than an unattractive waste. There is scarcely any condition of waste land on the farm that would not produce wood crops and this absolute forest soil is what the forester most desires to reach and improve.

It is the policy of the Ontario government to assist and co-operate with the farmer in bringing about improved conditions. The Department of Agriculture by means of the Agricultural College, Experimental Union, Farmers' Institute and specially trained men is ready to give assistance and advice in improving the wood-lot and redeeming waste lands. Forest nurseries have been established to provide cheap planting stock at a nominal cost, with instruction as to methods of care and planting. It is hoped by organization that we shall gradually improve the present conditions in the province of Ontario. If we can clearly demonstrate the practicability of replanting on waste lands in older Ontario it will create public sentiment in favour of more extensive forestry methods for the denuded areas which exist in other parts of the province. We

will also have learned many silvicultural facts regarding native species which will be of great value wherever more intensive management is required in the forestry reserves of the province.

In these days of scientific agriculture when the farmer asks the how and why of things, there are improvements developing in nearly all branches of the farm. The individual cow has to prove her value for dairy purposes by producing a quantity and quality of milk, which is determined by scientific records. Special market requirements call for a certain type of hog, and the farmer aims to produce it. Farm work is being done with definite results in view and we are gradually introducing rational business methods into the art of agriculture. Farm management in Ontario to-day calls for a better division of the soil. Most farm lands are made up of three divisions of the soil, absolute agricultural soil, relative agricultural soil and absolute forest soil. No arbitrary rules of division can be laid down because it is very difficult to say what is and is not non-agricultural land, for it must ever be a relative term. The proper division of a farm in this respect must be left to the owner to settle with regard to local requirement and conditions. In the early settlement of this country we find steep hill-sides or other less valuable land denuded and the wood-plot left on the most fertile part of the farm. We find men wearing out their lives on rock soils or on farms so sandy that the deed cannot hold them, when within a few miles fertile soils are lying untouched. At first thought it might be imagined that the settler would use discretion and not tie himself down to poor land. However, cases of this kind may be found all over America. The strangest part of it is that it is frequently impossible to make the settler on such poor land believe that he is not well located. He is influenced by his environment and becomes a shiftless and worthless citizen.

Settlers in new lands being opened should be directed and educated to avoid the mistakes of the past and such education is a very legitimate function of any government. This is a question worthy of the attention of agricultural educators and leaders. Survey should precede settlement from the forestry and agricultural standpoint, and the provincial government is doing well to preserve from settlement certain absolute forest lands in New Ontario.

HON. A. A. C. LARIVIÈRE,

Representing the Province of Manitoba.

I carry no brief, and, therefore, I will be brief. It is only two days since I was instructed by the government of Manitoba to act as their delegate to this convention. I left Montreal at once to attend this very important meeting. And I am glad to say that I have learned a great deal since coming amongst you. We in Manitoba are very much interested in this subject of forestry. But we labour under grave difficulties. As a province, we are only minors; we do not possess our own soil, but are under the tuition of the federal government. Therefore we naturally look to the federal authorities to attend mainly to forestry questions. We believe that they should have a wise and comprehensive programme on these matters.

But we have not been idle. Over twenty years ago, one of the founders of this Canadian Forestry Association, Sir Henri Joly de Lotbinière, of whom we have heard to-day, made a tour of the west. While in Manitoba he advocated tree planting in our province. It was my lot at that time to be Minister of Agriculture in the provincial government of Manitoba, and it was my duty as well as pleasure, to attend the meeting at which Sir Henri spoke. I do not remember whether I presided or not, but I know that I was there. And I had the pleasure of congratulating my old friend Sir Henri—for we had known each other before—upon the good line he had taken, and thanking him for sowing the good seed amongst us. This meeting is proof that that seed has grown. We have to-day an association that is of great importance. The papers and

discussion that we have heard within the last two days prove that the people of Canada generally are alive to the importance of this great question.

A mistaken idea prevails in certain quarters that Manitoba is altogether a 'Prairie Province.' As has been stated by Mr. Ross to-day, we have great forests in the northern part of the province. We have a very considerable forest area also in the eastern part of the province, near the Ontario boundary. There are also patches of forest in the western and southern parts of Manitoba as well as in the Pembina mountain district. So far as the growing of trees in the prairie country is concerned, there has been to the present day, no comprehensive and workable system. As Mr. Ross has said, we put legislation on our statute books to foster and encourage tree planting, but no great success was attained—in fact, we had to repeal the law on the subject that we passed. But there is new life in the province in relation to this and cognate matters. The provincial government is now establishing an agricultural college on a very large scale. In fact, the province is spending not less than \$1,000,000 in establishing that institution. Of course, the new college will afford means of education in tree culture and forestry. An extensive lot of land has been secured for the purposes of the college, affording scope for practical training in these important branches. I am in hopes that one of the professors of that college will be able to attend the meeting of the Forestry Association next year and give you an account of what is being done in Manitoba in relation to forestry.

I regret very much that, the lieutenant of His Excellency having called the legislature of Manitoba to meet for the despatch of business this very day, it has been impossible for any member of the government of Manitoba to be present on this occasion. Therefore they have asked me to represent them. On account of the very short notice I received, it has been impossible for me to prepare any elaborate statement of the conditions in Manitoba in relation to forestry and tree culture. But this I can say to you, that the government of Manitoba, the legislature of Manitoba, and the people of Manitoba as a whole, take a very deep interest in the work you are doing, and they look to you for guidance, assistance and encouragement in the great work of forestry that is before us.

MR. J. D. ALLAN,

President of the Toronto Board of Trade.

I have the honour to appear before you as a member of the delegation from the Toronto Board of Trade. At the present time, I have the honour to occupy the position of president of that large commercial body. When we received your invitation to participate in this convention, our council at once decided that, agreeing with the object you had in hand, we should gladly take part in this convention. Now, as representing a large commercial body, we have come here as listeners. And I may say, for myself and the other members of the delegation, the others being the ex-president, Mr. Ellis, and Mr. R. C. Steele, vice-president, we have sat here since yesterday morning as most interested listeners. We have received an education which is extremely valuable. We have had some erroneous ideas removed and some very beneficial ideas inculcated. First, I may say, as a native of Canada, what has been said from the beginning that, while we have some reasons for pride in our method of handling our forest wealth, there are reasons why we should feel humiliated also. I regretted exceedingly to hear the statement from you, Mr. Chairman, made yesterday

that not more than ten per cent of the timber wealth of this great Ottawa valley had been removed for the use of man, the other ninety per cent being destroyed by fire. I quoted that statement to a lumberman from another part of the country, and he said that so far as his own section was concerned that statement, if applied, would be well within the mark. It did strike me that we, as inheritors of such a magnificent domain had been a good deal like the unprofitable servant mentioned in Scripture; we had wasted our talent instead of caring for it and using it to the best advantage. When we look at the figures that are displayed on these walls, we can understand what an influence the forest must be upon the commerce of the country, and from the remarks of the distinguished gentlemen whom we have at present with us, it is easy to see what influence the forest must have upon the happiness of the people and upon the development of the country in many different ways. As I have listened to the papers and discussions here, that which perhaps has struck me most forcibly, is the earnestness and devotion shown by those gentlemen who have this part of our public affairs in charge. And I thought over and over again that the Dominion of Canada is to be congratulated upon the fact that it has in its service men of such thoroughly patriotic spirit and such devotion to the work that has been assigned to them. Sometimes men work for the glory and honour that is given them by a grateful people. Their reward is sure if their work is of such a nature that its results become at once apparent. But the man who is working as a forester is working for the advantage of future generations, and his reward must be in his love for his work and in seeing that work make due progress under his hands. We have had evidence here on this platform that we have in the service of the Dominion gentlemen of whom we as Canadians have every reason to be proud.

I did not come here with the idea of addressing this convention; but, as a representative of an important commercial body. I am glad that the invitation was extended to these bodies. I am sorry that I have no data by which I may judge how general has been the response on the part of commercial bodies to your invitation. But I can say that so far as the Council of the Toronto Board of Trade is concerned, the report that will be carried back to it by the delegates it has sent here will be that the forest is one of the most important interests we have in this country and that it must receive greater attention at our hands than it has received in the past. It seems to me that we are like a great commercial or banking institution receiving reports from the gentlemen in charge of its business. These gentlemen have too unobtrusively told us of the great value of our property and of the work that has been done in connection with it. And, because of the devotion they have shown and of the importance of the interests they have in charge we must be prepared to give them greater latitude in the future than we have given them in the past. There are many things in this connection which I would like to say, but I must not take up too much time. I was particularly pleased with Mr. Stewart's address. I had heard him speak before. He addressed the students of Toronto University, showing what could be accomplished in forestry. Until I heard that address I was under the impression that we were very largely neglecting this work. Years before, before the completion of the Canadian Pacific railway, I used to travel the immense domains of the Canadian North-west. There were no attempts then to grow trees there, and I have often thought and wondered how it would be possible, in the future, to overcome the difficulties which these treeless plains presented. When I heard Mr. Stewart's address I could not but think what a

fortunate thing it was that the Canadian Pacific Railway had chosen the southern route across the prairie belt, for at that time our forest policy was so little developed that the building of that road through a forest country would have resulted in tremendous destruction of timber. We have still these great tracts of timber to the north. And I was gratified to find that, under Dominion control and with our Dominion forestry service we have such knowledge of our forestry resources as is embodied in the map which Mr. Stewart displayed. Through that wooded country the Grand Trunk Pacific and other railways will now find their way. But the interest of the people has been sufficiently aroused to prevent any unnecessary destruction of timber. I blush for my country when I think of what has been done in the past in the way of denuding our land of timber. I was born in a lumbering district in the province of Ontario. I know the truth of a great deal that has been said here, but I know also that the lumberman has often been charged unjustly with helping on the destruction of our forest wealth. Conditions were imposed upon the lumberman which made it necessary for him to do what has been done. But let us not cry over spilt milk. It has been stated by one of the distinguished gentlemen from the United States that our policy has been more enlightened than theirs. Let us take courage, and let us see to it that in the future legislation shall be enacted that will prevent the further wanton destruction of our forests.

In foreign lands, I have had a considerable opportunity of knowing what has been done in relation to forest preservation. I do not wish to go over any of the ground that has already been covered here, but I would like to say a word as to what I have seen in Russia, and what, to my knowledge, the Russian government has done in developing and applying an enlightened forest policy. I have been many times in Russia and am tolerably familiar with the districts to which I shall refer. Last September, when in St. Petersburg, I took great interest in learning some details regarding the forest policy of Russia and the results of that policy in the forests under government control. I have here statistics furnished me by one of the departments of government. Under one policy there are 500,000,000 acres under forest, with a well devised forest policy developed within the last fifty years. The government forest contains 300,000,000 of acres divided into 1,500 districts, each of which districts has an officer responsible for the carrying out of the government's policy. The Crown forests, the property of the Royal Family, cover 15,000,000 acres. More than that, rules have been imposed upon the private owners of forests aggregating 185,000,000 acres restricting them from abusing their property. The government also assists private enterprise in setting out forests and in tree planting in the prairie country. They have two higher and thirty lower schools of forestry maintained by the government. The chief institute in St. Petersburg has a staff of fifteen professors and is attended by 450 students. The lumbermen who cut on government land are obliged to clear the ground of debris and to hand the land back to the authorities in satisfactory condition. To insure this being done, a deposit of from \$2 to \$3 per acre is exacted. This is something I did not expect to find in a country that we generally regard as being so far behind in many respects.

Another matter has been referred to here, and very interestingly demonstrated by Dr. Saunders—the growth of wood. When I returned from Russia last I visited some friends in Scotland. They asked me what we were doing in forestry. Fortunately, I had at that time heard Mr. Stewart's lecture and seen the photographs showing the

result of his work, and therefore I was able to cover up the fact that we had been so long, as it were living on our capital so far as the forests were concerned, and, but for the great wealth we had would be, by this time, mere paupers in this respect. My friends told me of a small district at the mouth of the Tay, seven miles from Perth. This district had been planted in 1860 with four year-old Douglas fir. In 1888, the plantation was estimated to contain 3,738 cubic feet of timber per acre, exclusive of the tops, showing an average increment of 117 cubic feet per acre during the 33 years since the trees grew from the seed. In 1900, a merchant offered ninepence per cubic foot for the timber, or £200 per acre for the forty year-old plantation. In 1903 it was estimated that there was a stand of 210 trees per acre, with a mean height of 83 feet and diameter of 16 inches, making 11,170 cubic feet per acre, showing an annual increase of 495 cubic feet per acre in 15 years, worth £15 at ninepence per cubic foot. Sir, as a Canadian, I would not like to confess that old Scotland can do better in forestry than we can.

I do not wish to take up more time. I trust that the proceedings of this convention will be published in full, for I believe there is more in what we have heard here than the public of this country really are aware of. I think we have heard particularly valuable papers from the Dominion and provincial officers whom we have heard. And, if the Dominion government has nothing to do with education—and that, I believe, has unfortunately been laid down for us in the British North America Act—still, I think that the time has come when the importance of forestry should be made known through our public schools. Let us have something practical as a result of this conference. One word used by Mr. Stewart yesterday struck me particularly. He said: Timber is a crop. That should be on the head line of every copy book in the common schools of this country. We have been too long considering timber as an incumbrance. It is true that it has been said in the Psalms of David that a man was great in proportion as he had laid his axe against the heavy trees. That has been a rule of greatness that we have too generally followed in Canada. One gentleman made the remark that there was too much talk of the future and that we ought to have some profit for the present. By a wise forest policy we shall get profit in the present. But we have had a heritage handed down to us from our ancestors and, we are bound to consider the future and to hand down that heritage unspoiled and unencumbered to our descendants. And if, as we like to believe, we are laying the foundations of a great nation on this western continent, let it not be said that we have proved unworthy of the great inheritance which is ours. Let us rather be said of us that we have passed on this inheritance increased in value and with it have passed on the knowledge which the experience of our stewardship has enabled us to gain.

HON. MR. TESSIER,

Minister of Agriculture for the Province of Quebec.

I may say at once that my knowledge of the English language is so deficient that I shall not attempt to make a speech to you.

I speak without preparation, and all I can say is that I have come here to learn, to gather information that will enable me to do something for my province and for my country. I have been very much interested in all that has been said, and not only interested, but instructed also. With all humility I acknowledge that I have learned much that is quite new to me. But I have long been of the opinion so well expressed



POPLAR AND BIRCH ON MOOSE MOUNTAIN FOREST RESERVE, SASK.

by the high authorities who have addressed you, that it was most important for this country that something should be done to protect our timber. The forest represents for us immense wealth, and we must admit that that wealth is being destroyed without proper efforts being made to reproduce it. As was said by the gentleman who preceded me, we have destroyed part of the heritage we received from our forefathers, and it is now our duty to try to atone for our errors and try to hand that heritage down unimpaired to those who come after us. And, if we follow the counsel that has been given us by the experimentalists who have spoken on the subject at this convention, we shall certainly do great good. I thank you for listening to the few words I have said. I know they are not of much importance. But, having been called upon by yourself, Mr. Chairman, I thought it my duty to acknowledge your invitation.

PROFESSOR G. C. CREELMAN,

President Ontario Agricultural College.

I feel it to be indeed a privilege to be called to this platform, to look into your faces and to say a few words to those who have come from all parts of our country to consider a problem which though but little discussed, perhaps, among the people generally, is, nevertheless one of the greatest problems before the Canadian people to-day. It is a most hopeful thing to find so many thoughtful people interested in the subject of forestry. I am glad particularly to see here so many gray heads. The presence here of men of age and experience is an assurance to us that we are to benefit by the mature ideas of those who have been thinking out these problems. It has been most gratifying also to note how the addresses have been received of those who have experimental knowledge to give. The result of our discussion must surely evolve some plan which will be beneficial to the nation at large.

We of the Ontario Agricultural College at Guelph have been endeavouring to do something in forestry to benefit the farmers of the province on their own farms. We believe that these problems of agriculture must be worked out individually by the farmers themselves, after all the experiments have been tried by us, and after all the discussions at conventions such as this. We cannot do the work; we can only supply what the old fashioned Methodists used to call 'rousements.' We have been trying in our own way to help improve the condition of the province in relation to forestry. This year we have half a million seedlings for distribution amongst the farmers of the province. We hope next year to have a million, and thereafter to increase the number with even greater rapidity. I trust that the result of the work which we and others are doing will be that soon every part of the province will present a spectacle of beauty, a beauty which will be none the less appreciated because it at the same time brings a greater addition to our wealth.

MR. A. P. STEVENSON,

Inspector of Tree Planting for Manitoba.

It affords me a great deal of pleasure to be present at this meeting and hear the papers and discussions on the subject of forestry, a subject which has always been to me one of great interest. That phase of the subject which has been most generally discussed here, I observe, is the preservation of our forests. As a dweller on the plains of

the west for thirty-two years past, you can well understand that the question of planting and propagation interests us rather more than the question of preservation. Therefore, it is on the subject of tree-planting that I shall endeavour to occupy your attention for a little time.

It may be mentioned here that the early settlers in the Canadian west did not take kindly to the planting of trees. This is easily explained. The majority of our settlers came from Ontario, where much of their time had been spent in cutting down and rooting out trees rather than in planting them. Is it much wonder then that they did not take kindly to the planting of trees when they first settled on the prairies of the west? Another reason why so few trees were planted by the early settlers was that in those days it was difficult to procure suitable plant material in the shape of hardy native trees. Many did plant trees that they had brought from Ontario, but these were not hardy enough, consequently most of them died within the first year. As a result many farmers were discouraged and came to the conclusion that trees would not grow on the prairie. However, there were a few who planted trees and were successful in growing them. And these successful ones scattered throughout the country were an encouragement and object lesson to their neighbours to persevere in tree-planting. After a time, the experimental farms sent out a considerable amount of suitable planting material to the early settlers. This was highly appreciated, and a great many trees were planted out by farmers. It is worth mentioning, in this connection, that in nine cases out of ten the trees were not planted in a position to give the best results in beautifying and sheltering the farm home. Usually, the trees were planted close up to the buildings, often right in the door yard. In a few years these trees grew up and became much of a nuisance by reason of the fact that they held the snow banked close up around the buildings, keeping the water and mud there until late in the season, and making it unpleasant and difficult to move around. Consequently, many felt discouraged about planting trees, and were rather inclined to cut down those they already had growing.

The co-operative tree-planting scheme of the Dominion government was inaugurated in 1901. This scheme has been outlined to you by Mr. Ross, Assistant Superintendent of Forestry, so that it will be unnecessary for me to go into details. Under this scheme trees were not sent to any applicant until the inspector had visited the land to be planted, seen if properly prepared, and pointed out to the farmer where and how the trees should be planted so as to gain the best results. It is unnecessary for me to speak about the great progress of the scheme, as that has already been explained to you. I have the honour to be one of the inspectors of tree-planting for Manitoba. On that account I travel a great deal and have an opportunity of examining the trees that have been planted. It is most gratifying to know that fully eighty per cent of the trees sent out are doing well. One of the main essentials to success in growing trees in the west is cultivation. Grass is one of the greatest enemies to the growing of trees in Manitoba. Let the grass once get along the roots of the tree and there is little chance for success. Discussing the scheme generally with the farmers, I am glad to say that it very popular indeed. It makes no difference what a man's political leanings may be, all are agreed that this scheme is a step in the right direction. The only regret that I hear expressed is that the government did not start the scheme many years ago.

I would like to mention a few of the benefits derived from a shelter belt on the prairie. In the first place, a shelter-belt judiciously planted out is necessary in order to protect the farmer and his family, and also his live stock on the farm. This necessity may not come home to those who have not lived on the plains. But those who have lived there know how the cold winds sweep across the prairie in winter, and the hot winds in summer, and thoroughly appreciate the advantages of a good shelter-belt.

Although, as has been stated to you, there are considerable forest areas in the northern parts of the province, the western and southern part is practically all prairie, and here shelter belts are especially necessary. Not only do the trees afford shelter to people and to live stock, but they make it comparatively easy to grow many varieties of vegetables. The snow drives into the bluff where it is held long after it has melted off the prairie, this snow melting gradually, keeps the ground moist well into the summer, an ideal place where vegetables can be grown. And there is also the question of growing fruit on the farm. On the prairie it is almost impossible to succeed in growing any kind of fruit without protection, but nearly all the desirable varieties of the small fruits can be grown where protection is afforded. With judicious shelter we can produce not only all kinds of hardy small fruits, but crab apples, and, in some places, even standard apples and plums. In that connection I may say that many of the farmers who have had wind-breaks established for a few years are planting out young orchards of hardy varieties of apples, and with the best prospects of success. I close by thanking you for the kind hearing you have given me.

DR. C. A. SCHENCK.—It was a great surprise to me to hear my name called, for I did not suppose that the honour would be disposed upon me, a foreigner, of addressing you a second time. And, now that I have been called upon, I hardly know what I can say that would be of interest to you. If I were to talk business, the business of forestry and to discuss my own occupation and the little forestry realm of which I have charge, I fear that the matter would appear so small in comparison with the vast area with which you are dealing, and with the problems you have to face that it might not interest you in the least. The relation of forestry to agriculture has been discussed here. If I were to tell you what connection my work as a forester has with agriculture, I think it would make you laugh. The only connection I have with agriculture is when the agricultural department of the estate turns over to me a plot of one hundred or a hundred and fifty acres of worn out land which they cannot use any more, and tells me to make the best use of it I can. And, of course, to make the best use of the land I plant it in trees. The conditions at Biltmore are extremely favourable, in my opinion, for a good financial outcome from the investment. I would not advocate planting on land far away from means of transportation. But there, where farming operations are conducted and we have ready access to a near-by market for every piece of timber or fire wood at a good price, I think planting is one of the best investments which Mr. George Vanderbilt, the owner, can make. It is true that it will bring returns only after a great many days. It may be twenty times 365 days—omitting the leap years—but, after that time, I am confident I can obtain from this plantation as much money as we have put into it, with a good interest added, and, at the end of forty or fifty years have a domain which will be greatly improved in value.

I wish I could live to see it. One of the delights of a forester's life is to travel through one's own plantation. After all, creation, imitating the Great Creator's work, the creation of values not only aesthetic, but financial, is that which gives us the greatest possible delight. My Christmas tree this year was a Douglas fir, planted sixteen years ago, and thirty feet high. Of course, I could not get it all into my humble shack. It was one of several dozen, and one of the biggest, and I assure you it gave me great delight.

In travelling here from my home in the United States, I passed in the train places that showed the sad results of the destruction of the forests. We speak proudly of making two blades of grass grow where one grew before, but is it not too often the case that our civilization prevents the grass growing where once it grew? In my section of the United States, North Carolina, the destruction of the natural resources of the country has been gigantic. We need not go to Spain or to the realm of the Moslem, nor need we go back hundreds of years to find places where the productiveness of the soil has been annihilated and human life on that soil made impossible. We are all equally dependent upon the maintenance of the productiveness of the soil. By destroying the earth's crust upon which we live, we take away the very basis of our own lives. It seems to me that it is a great task of the Anglo-Saxon race to which you all belong to break the rule that where civilization goes the resources of the earth are destroyed. Let us pledge ourselves and our abilities to the establishment of the rule that wherever Anglo-Saxon civilization goes two blades of grass shall grow where one grew before.

MR. GIFFORD PINCHOT.—I am sorry to say that owing to having discussed imperialism with His Excellency, the Governor General, until a late hour last night, my voice has completely disappeared. Therefore, I shall have only a word to say. In the two days' conference here, that which has struck me most is the thoroughly admirable progress you have been making in tree planting on the plains. I had not the slightest idea before coming here what had been accomplished on your side of the line. I desire to express my strong admiration of the work that Mr. Stewart, Mr. Ross and the other officers of the department have been doing in producing forests where, until recently, it was supposed to be entirely impossible for a forest to grow. We are looking forward, on our side of the line, to planting literally millions of acres. Of the 100,000,000 acres of our forest reserves, doubtless one-third or say 30,000,000 acres, is bare of trees. But much of this land is capable of supporting trees. On both sides of the parallel which separates us we must look forward to tree planting on a scale never seen in the world before. It is work so large that, if we were not constitutionally hopeful people, we Anglo-Saxons, we should shrink from it. But we do not shrink from it; on the contrary we look forward to the accomplishment of it, and we shall succeed.

There are many reasons why this work is imperative. One of them I heard expressed by a man who, though he sought one of the objects we are seeking, the conservation of the water supply, desired to gain his end by the construction of reservoirs rather than by the growing of forests. He said: If a man is great because he makes two blades of grass grow where but one grew before, how much greater is the man who causes two drops of water to flow where only one drop flowed before.

AFTERNOON SESSION.

THURSDAY, January 11, 1906.

The secretary read a telegram from Mr. F. W. Jones, President of the Mountain Lumbermen's Association of British Columbia, conveying greetings and expressing the interest of that association in the objects of the convention.

A letter from Hon. Walter Scott, Premier of Saskatchewan, was read in which he expressed the sentiments of his government and province as to the importance of the forests and the necessity for making proper provision for the future wood supply, and promised his support to the movement.

HON. W. C. EDWARDS,

President of the Quebec Limit Holders' Association.

I appear before you this afternoon with a good deal of diffidence, I assure you, because I am to attempt for a short time to deal with a subject which is a special study of gentlemen here who are very much more conversant with it than I can possibly be. It would be desirable, I think, for any one addressing a Canadian audience on a subject of the great importance that this is to Canada to have some time to prepare an address, to put it in writing and then to read it. I think that would be the better way. It is not because I have not had sufficient notice, but unfortunately for me I have not had the time and I only took a few notes while coming up on the train this morning. More than that, as I stated before, I do not come before you as one of those gentlemen learned in this special subject, but I appear before you as an ordinary Canadian wood-sawyer.

The subject of forestry is a subject of very great importance to all countries and more especially perhaps to Canada because of its geographical and other conditions. I congratulate you, Sir Wilfrid, most heartily on bringing about this convention for the purpose of discussing a subject which is of such very great importance to our country. It is important in many aspects. Apart from the forest itself, as far as the landscape is concerned is it not desirable that forestry should be studied and that our farms and the country generally should be studded with the most beautiful aspects of forestry? Then again arises the question of the water supply, and coming down to the manufacturing and industrial aspect, there is the question of the lumber supply, which is one of very great importance to this and to all other countries. Not to overlook the great importance of forestry as applied to agriculture every one who has made any study of this question at all knows very well that in order that the country shall make its best development in so far as agriculture is concerned forestry bears an intimate relation thereto. But finally, there is the question of the water supply in so far as industrial purposes are concerned in a manufacturing way, and before terminating my short address I shall endeavour to refer specially to that matter. Years ago it was supposed that this Canada of ours possessed forests to such an extent that they were practically inexhaustible, and if those present will refer to the speeches made in the

Dominion House of Commons, 20, 25 and 30 years ago they will find that the chamber resounded on many occasions with the speeches made referring to our inexhaustible supply of timber. A very great change has taken place in the minds of the Canadian people in regard to that subject to-day. That idea has disappeared to a very great extent, and there are differences in the minds of the people to-day even as to the real position. There are those who confidently believe yet that our forests are inexhaustible and there are those who believe that they are almost destroyed. I take the medium ground. They are not inexhaustible, but they are not destroyed. If better methods had been adopted years ago I think it would be possible for the Canadian people to say to-day that their forests were inexhaustible. Though late in the day I claim that there is a great deal that can be done. Our forests can be saved to a very great extent; I claim that they can be restored to a very great extent, and I will endeavour to point out how this may be done.

The question first arises: How is it that our forests have been devastated to the extent that they have been? The wood-sawyer, the profession to which I belong, is the accused individual. He has done his little share in so far as helping to cut down the timber is concerned, but I hold, and hold firmly, that he is the friend of the forest. If no other instrumentality but the lumberman's axe had been used in Canada, if no other engine of destruction had ever been put into effect we would to-day have a green and unbroken forest and the lumbermen engaged in the manufacture of lumber to-day in Canada with a great many more lumbermen added thereto would not be able to cut the natural growth of the timber. One of the next instrumentalities in the destruction of our forests is the railway. I claim that the railways have been very great destroyers of the forests of Canada, and I do not think that any one can point to a district where a railway has been constructed through a forest that has not suffered from the destruction of the forest in the immediate vicinity. Because I say this I do not imply that we should not have railways. We must have them, but the best methods should be implied to hinder the destruction of the forests. Legitimate settlement has done its fair share. Admitting that this is true we would not pretend for one moment to say that even suppose we were running the risk of destroying our forest to some extent we should stop legitimate settlement. No one who was a friend of this great Dominion would think of anything of the kind. We must have legitimate settlement, but, Sir Wilfrid, I am coming now to the greatest engine of destruction—to the very greatest engine of destruction that the forests of Canada have suffered from, and that is illegitimate settlement. Many of these settlers, through well-intended but misguided efforts in that respect, have been the great destroyers of our forests in Canada. If that instrumentality had not prevailed to the extent that it has prevailed three-quarters of the forests of Canada, that are now destroyed, would be still green and unbroken forests.

Having in these few remarks pointed out to you the destruction and the principal means by which the forests have been destroyed, the question I am sure, that will be asked now is: What would you do to stop this destruction; what would you apply as a remedy to restore as far as possible the former conditions? I hold the view, and I hold it very firmly, that even to-day if the forests of Canada are well administered, if this illegitimate settlement is stopped, if improper speculation in so far as the timber limits of Canada is concerned is stopped,

the time need never come when Canada will be short of a timber supply. Now, to arrive at that end the first and the all-important matter is to keep fire out of the forests that we now have, next you must have proper government regulations, and in the next place there must be careful cutting on the part of the lumberman. Do not misunderstand me, for I do speak this afternoon first as a Canadian, if I am a lumberman. Though I am somewhat largely engaged in the industry of lumbering do not think for one moment that I would hinder you from permitting other Canadians, in the very small way in which I began myself, from engaging in the industry, but I do say that the small lumberman and the speculator is the very greatest enemy to the forests of Canada, next to the illegitimate squatter. Do not understand for one moment that I refer to the men who go into the enterprise of lumbering in a small way and build it up to great things because I refer to the men who get a small number of trees in some illegitimate way, cut off the timber as rapidly as possible and make what they can out of it. It is to that kind of lumbering that I object. The small lumberman and speculator with no permanent investment are the greatest enemies of the forest. I need not say how the lumbermen to which I refer generally operate. They are a class whom I personally am in the habit of calling thieves. After we buy timber limits, they, by some hook or crook, buy our territory from the government and in many instances they have done so; we buy the timber back from them and they leave the country. At this very moment I myself have a shanty—some call them camps—where we are cutting timber which was ours four or five years ago. It was taken out of our limits, it ceased to be ours, parties bought the timber but never settled properly on the land and never will, and we are now cutting the timber and paying them for it. This has been repeated and is being repeated constantly in Canada to the detriment of the forests, and to the detriment of the very best interests of Canada. I myself can take you a distance of six or eight hours from this city to a spot where I can show you that an illegitimate settler, for the purpose of raising five bushels of potatoes, destroyed over \$2,000,000 worth of timber. This does not prevail only in that district but it prevails almost all over the pine districts of Canada or the portion of Canada with which I am acquainted as a lumberman. My first remedy, as I said, for that condition would be to bring about such a provision as will in so far as it is possible practically exclude fire from the limits. I spoke about careful cutting on the part of the lumbermen. What do I mean? I mean that no worse condition in so far as our forests are concerned could exist than to have lumbermen of this kind who have no large investment but who hold some timber, cutting that timber without regard to the consequences. What I hold is that the best condition of all is to have a lumberman who has a permanent and large investment to sustain and maintain and one who desires to conserve the timber for the supply of his establishment. As a consequence I hold strongly that large holdings on the part of the lumbermen is the very best condition, and if I were permitted to organize a system for Canada, in so far as the cutting of timber is concerned, my system would be that every mill owner should build his mill in proportion to the growth of his limits and cut annually the growth. If that is done and fires kept out, the limits of Canada will never disappear. Every lumberman should simply cut the growth of his limit and no more.

Now, having gone this far, I desire to say a few words about the possibility of restoring and perpetuating our timber. Spruce such as we have here is a timber that

can be perpetuated to a very great extent. Pine can probably be perpetuated to the same extent. I am not familiar with southern pine, but my own observation would lead me to believe that the southern pine of this continent can be perpetuated. That is my view from observation. I do not know it practically, but in so far as spruce is concerned in our northern region here it has the very greatest possibilities. Next comes pine. Planting is suggested where the forests have disappeared, and I think that in many places that might be done. But in my experience that, in most instances, is not necessary. In districts in which I am lumbering, where they were cutting timber 75 or 100 years ago, we are cutting to-day and cutting very good logs. In a general way, I think spruce will perpetuate itself without planting at all, and I think pine in many districts will perpetuate itself.

Now, I will endeavour to give you a little illustration. I firmly believe that my statement will be questioned, but as far as my word will be taken, I will vouch for the statement as being absolutely true. In 1871, I bought the first timber limit I ever owned. I bought it from Hamilton Bros. on the Gatineau. It was called the Six Portages limit. I was regarded as very silly for having purchased that limit, because it was considered to be absolutely exhausted and worthless, but we are cutting timber on it still, and we expect to be cutting on it for the next thirty or forty years. When we purchased that limit there was a farm upon it at a place called Round lake. That was in 1871; it will be 35 years ago next spring. Hay had been cut on that farm the year previous to our purchasing the limit. I visited it at the time we purchased the limit, but I never visited it again until four years ago, and when I went there four years ago to my utter astonishment the farm had become a thick forest of pine. When I came down and told a brother lumberman for whom I had the greatest respect, and who, I know, respects me very much, but when I made that statement to him he said: Edwards, this is the first time I ever heard you tell an untruth. Well, Mr. Robinson, who is sitting here, was the representative at that time of Hamilton Bros., from whom I bought the limit and last autumn, to verify my statement, I took him to the spot and showed it to him. He knew that it was a hay farm when I bought it. Mr. Robinson and myself measured several of the trees with this result: We measured three 14 inches in diameter 30 inches from the ground, one 15 inches, one 17 inches, one 18 inches and one 19 inches—a pretty hard statement, but it is true all the same. Some three or four days ago I sent a photographer to that point to get photographs of those trees, but I do not know what in the world has become of him; he is not back with the photographs. I telegraphed at noon to him. You perhaps think that fellow is hiding because he has nothing to bring back, but if this Forestry Congress continues until to-morrow I think I can vouch for it that he will have photographs of the trees here. I am not in a position to present them now, but I hope they will be ready to-morrow. However, that statement is absolutely true. If it applies to that district, it applies to many other districts in the pine regions of Canada. As to this question of growth and the possibility of restoring the forests I do not know whether what I am going to say is the case or not, but I think these scientific gentlemen on the subject have got down to a fine point what the growth actually is. I will give my own observation as a wood-sawyer in regard to that matter. My observation is that the growth varies very much in various districts, that in some places growth is very slow, and that in some other places it is very rapid. I think that perhaps this northern por-

tion of the Ottawa region and the portion from the Gatineau westward is the most rapid growing pine district we have in this portion of Canada. In that region it is my belief that if the pine is carefully cut, just as with the spruce, it will never be exhausted.

I think that to deal intelligently with this subject and to be able to make the very best suggestions as to how the forest may be perpetuated, one would need to be in a position to know what is being done in other countries. I had hoped myself to be able to look that up thoroughly so I am sorry I have not had time to do so. However, I have some little general knowledge of what has been done in Norway and Sweden, France and Germany, and there certainly the very best methods of forestry are carried out. I am very well acquainted with some Norwegian lumbermen who tell me that their forests will never be exhausted. There they never replant; they just depend on natural reforestation which, I think, is all that is necessary here. I do not think replanting is necessary although I think that in many instances and in many localities it might be desirable.

Another thing that I do think of the highest importance is this: While neither I nor any other lumberman desire to retard in the slightest measure agricultural development where it is possible and desirable, I do say that it is the greatest mistake that possibly could be made to allow pretended agriculture to penetrate our forests and destroy them. Especially is this true of the province of Quebec, a province that has timber lands extending over large areas of country that are suitable for forest production and not suitable for any other purpose. In my humble opinion they should be set aside absolutely for that purpose and for that purpose only, and it would be in the highest and best interest of the province that that should be done. I will give you a very special reason before I close, apart from lumbering, why I think it should be done. I would make an absolute division. I do not think it would be well to go into a district and separate lots, but I would make an absolute division between agricultural and lumbering districts.

Sir Wilfrid Laurier asked me this afternoon if I would state where, in my opinion, the forests of Canada now exist to the greatest extent. My company has explored a very considerable portion of the province of Quebec, from Labrador almost to Lake Abitibi, and I say that the region there covered, in my humble opinion, though very badly handled in former years, if care be taken, can be rich producing forest for ever. I do not think there is any question at all about it. Unfortunately in the pine districts the greatest damage in so far as fire is concerned has been done, but that whole region that I have in mind is more or less a valuable forest even to-day. Going westward from here there is a considerable portion of pine and more or less of spruce and mixed woods. Then, when we go into the district west and north of Temiscamingue, into the property owned largely by the Ontario government, there, I think, the best forests of pine exist to-day. I think that is the best pine region. In so far as perpetuation of the forest there is concerned, I am not so well able to speak, because I can only speak from information; I cannot speak from personal knowledge in the way that I do in reference to this other district. A very great mistake is made as to our remote northern regions. There are parties who think that you just have to go north to get plenty of good timber. That is not true. When you get to a certain point north—about 200 miles north

of this city—you are out of the valuable timber belt entirely, you have there no timber of any commercial account whatever.

There is another fallacy that exists in the minds of many, and that is as to the licensing of our territory. My humble opinion is that it would be far better if the entire area of timber limits were in the hands of the lumbermen. They are the best preservers of the timber, and in many instances there is timber wasting because it cannot be cut. It is not licensed and it cannot be cut. Right here on the Gatineau river and in other portions of the northern district we have pine which has become so old that it is rotten at the butt, and is useless for any purpose whatever. It is in the highest and very best interest of the provinces in my humble opinion, that every foot of timber territory should be covered by license. There are those who dread selling it because they think it means the destruction of the forests. It is the very reverse. Put these areas under license, under good regulations, do not offer a premium to lumbermen to cut too rapidly, but place them in a position to conserve for themselves this timber and you have the very best system of perpetuating the life of our forests. The lumberman, I say again, is not the enemy, but the legitimate lumberman is the very best friend of the forest. I am nearly done and I am sure you will be pleased to hear it.

SIR WILFRID LAURIER,—You did not answer my other question.

SENATOR EDWARDS,—What was that ?

SIR WILFRID LAURIER,—My other question was: What would you do if you were a despot ?

SENATOR EDWARDS,—Sir Wilfrid Laurier asked me what I would do if I were a despot. My answer was: Sir Wilfrid, if the people of Canada will make me the despot that they make you (not that you are), allow me to make all the regulations, and allow me to live for a few hundred years, I will save the whole territory. If I had the administration of the forests I would place the territory under license as rapidly as I could, and adopt the very best regulations that I could surround that territory with for the preservation of the timber. I would make it a rule that no man should own a mill too large to cut more than the annual growth upon his territory. I would keep out fires and I would preserve the forest for ever. But, I am not going to be allowed to do it.

I have been endeavouring to speak of something of which I have more or less practical knowledge. I am coming now to a subject, which I say at once, I have not the same knowledge of, but I am going to refer to it, and it is our schools of forestry and our forestry assemblages in Canada. I used to confront some of my friends who were engaged in these forestry assemblages with the statement that they simply came together for a few interchanges of thought, that they went away and that was all there was to it—a little sport, but, if this is the outgrowth of it I think a great deal has been done. I want to revert for a moment to my views on the forestry question. I have had several letters from young gentlemen who have studied forestry, wanting to know if I could engage them. I say: What for? What shall I engage you for? They say: To take care of my limits. I answer them: I think I know a great deal more about my limits than you do, and I do not think you can teach me anything in regard to them. I hope I am not treading on anybody's toes, but in my

humble opinion these schools of forestry are not carried on in a way to have the best results. In my judgment education in an establishment connected with a college will never have the practical results that it ought to have, and if I might be permitted to offer a suggestion in that regard, this would be my plan for a forestry school: In order to teach the lumbermen of Canada how to lumber I would use a forestry school for that purpose, and this is the way I would do it: I would set aside say a thousand square miles or 500 square miles, and on that I would establish a school of forestry. I would invite young men to come to that school to learn both theoretical and practical forestry right on the limits. I would have these young men make, first, a survey, under direction, of the timber that stands upon the limits, I would then have an estimate made, as near as possible and ascertain what, in a few years, has been the growth of timber on these limits. I would have these young men go around and mark the trees each year that can be cut. I would make them cut the timber, haul it and saw it. I would make every one of these young men into a first-class forester, and a first-class lumberman, and these young men in time would become the lumbermen of Canada. That, in my humble opinion, would be the greatest step in advance in so far as the cutting of the forest in an intelligent way is concerned, that could be devised.

Apart from the districts I have named there are many other portions of Canada that no doubt have enormous quantities of timber growing. I am not so thoroughly conversant with them. I have referred to the districts with which I am myself acquainted. Now, I shall conclude. The province of Ontario has special advantages and special features of utility. The province of Quebec, perhaps, has not the same area of agricultural land proportioned to its total area that the other provinces of Canada have, but, I hold now, and have always held firmly, that the province of Quebec is, if not the richest, one of the richest provinces or states on the North American continent. I hold firmly to that view. I have held that view perhaps singly as a Canadian for 25 or 30 years. It is a great province, and it is a far greater province than the people who possess it are aware. It is a very fair agricultural province, it is well administered, it has tremendous possibilities in so far as lumber products are concerned not only to-day but in the future, but I am coming to a matter to which I referred when I began to speak this afternoon, and that is the question of water-power. In all manufacturing power is the primary feature. The province of Quebec owns water-powers beyond and far beyond any province or state on the North American continent. The cost of manufacturing with coal varies from \$45 to \$60 and more per horse-power per year dependent upon the localities and conditions. Electrical power can be supplied in simply untold quantities in Quebec for about \$15 per horse-power. There are many who believe that the North-west is going to be the world in so far as Canada is concerned, but I hold firmly that our North-west friends are simply going to build up the east and that the east is going to become the great portion of Canada. I believe the day will come when the province of Quebec, portions of Ontario and other portions of the country that I am not so familiar with—certainly the whole province of Quebec—will be the manufacturing centres of the North American continent. I do not think there is any doubt about that. How are you going to preserve these conditions? Denude the forests and you will not have these conditions; maintain the forests and you will have them. If a premium is offered to the people of the province of Quebec to maintain their forests unbroken and to maintain the water supply which they have—the greatest inheritance

that any people could have in so far as power and manufacturing are concerned—that province, although its finances perhaps may be a little at fault to-day, will some day be the manufacturing centre of the continent.

FORESTRY FROM THE LUMBERMAN'S STANDPOINT.

J. B. MILLER, PRESIDENT, ONTARIO LUMBERMEN'S ASSOCIATION.

The preservation of the forest is of the utmost importance to the lumberman as upon it depends the duration of this industry. The policy of the Ontario government (I am speaking only for the Ontario lumbermen), has been such up to the present time that there has been no encouragement for the lumberman to attempt the preservation of his timber. In fact in most localities he has been forced to cut it off as rapidly as possible to save it from the so-called settler, or what he really is, the timber farmer or pirate.

The great bulk of the territory from which pine timber has been cut during the last thirty years has not been good for agricultural purposes and should never have been opened up for settlement or location. What has been the result of it being opened for location? Thousands of abandoned clearings, many of which were occupied by people from the mother country, who came here in the hope of becoming landed gentry, and who were totally unfit to combat the hard conditions to be found in any new country, let alone the conditions they found in such lands as they located on in the timber belt,—the story of whose life has been so ably depicted by Mrs. Moodie in her different works.

Only people thoroughly inured to the hardships which have to be borne by pioneers were able to get a start and remain on their farms, there being this difference between them that the practical farmer who settled in these districts did so with the intention of living by farming and located on blocks of good land to be found in certain localities in the timber districts, while the former located wherever they found fine views or finely wooded lands. In the majority of cases the class of locatee I refer to above did not locate for the purpose of making money out of the timber, but it only took them a short time to find out that the only way they could make a living at all was from the timber, and not from what they could raise on the land. The result was that they denuded the land of all the timber to make money enough to live or to leave the country with. When they left the country, as they did in the large majority of cases, they left behind them large areas of burnt country and barren rocky clearances, rendered useless for the lumbermen or for further cultivation. Besides these two classes of locatees, there was the timber farmer, by long odds the greatest destroyer of timber and the most dreaded by lumbermen. Prior to 1880 when the law was changed in Ontario so that pine timber remained the property of the licensee and did not become the property of the locatee upon his procuring his patent, as has previously been the case, nearly all the good pine lots on the government roads and a great many back of these roads were located for the sake of the pine. The lumbermen repurchased a considerable quantity of this timber from the locatees, in most cases for less money than he would have had to pay the government for dues. Upon their selling the pine, the bulk of the locatees left the country, abandoning their locations after having done tremendous damage to the timber by reason of fires and otherwise. Although the lumberman succeeded in purchasing back much of the timber which he had lost through locations, as mentioned above, he would have been much better off had the land never been located, as a great deal of timber was destroyed through these locations, and he was forced to cut in places and at times that did not suit him, to save the timber. In many cases he was not able to buy the timber from the locatee, and therefore lost it. And the province also lost a large revenue which it would have received in dues had the title to the timber remained with the lumbermen.

After the year 1880, and up to the time that hemlock bark became valuable there were fewer locations and the forests suffered less than previously, but this respite did not last long, as the timber pirate soon became aggressive once more, and in a more aggravated form, as this time the movement was organized. Where before there had been no concerted action, certain men now made a business of taking out hemlock bark, and selling it to the bark companies. These men, not satisfied with the bark they could procure from lands already located and abandoned, had a set of men who made it their business to locate lands for the sole purpose of getting possession of the bark and selling it to them. In many localities where the logs would cost more to get out than the low price of hemlock lumber warranted this resulted in a destruction of the timber, which after being stripped of the bark was burnt or allowed to lie on the ground and rot. It has been conservatively estimated that fully fifty million feet of hemlock logs have been annually destroyed in this manner for some years. This means an economic loss to the country of fully half a million dollars annually; besides a further large loss of revenue to the province, both from no dues being paid on the bark taken out by locatees or on the timber destroyed. Besides this enormous loss through the destruction of the hemlock logs, these men destroyed immense quantities of other kinds of timber in the process of their bark cutting and so-called clearings.

I am pointing out these facts to show how hard it has been for the Ontario lumberman to do anything towards the preservation of his timber under past and present timber regulations. I cannot see how much can now be done in the older districts for the saving of what timber is left, unless the government carry out something along the line of the following suggestions. To have a proper inspection made of all lands for which locations are being asked, and to make a hard and fast rule that there must be at least sixty per cent arable land on all lots applied for, and then only where there are other lands in the same locality which are fit for settlement. It would not do to locate one lot in a group of say ten or twenty, where the others were unfit for settlement. If this were done a large quantity of timber on the surrounding lots would likely be destroyed by fire in the clearing up of the one located lot, amounting to a good deal more in value than the cleared land on the one lot possibly could.

Any located lots which are abandoned should be withdrawn from further location. In addition to the suggestions made above (unless the government see their way clear to stop the locating of all lots in the timber belt) perhaps the most effective way to stop timber farmers from locating would be to put hemlock in the same category with white pine, and leave it in the possession of the licensee even after the lots are located and the patent granted. This would not be a permanent remedy, as other woods are all the time becoming more valuable, and locations will be made for them in the future as there have been for pine and hemlock in the past. The only really effective way is to stop the locating of lots in the pine and hemlock timber belt in townships now open for location, and reserving all others for timber only.

A great deal of trouble has been caused by the government recognizing the rights of squatters, a man who as a rule is imbued with roving and hunting instincts, who makes a temporary home on lands in advance of settlement and later moves on as soon as the game is thinned out, and looks for pastures green. These men have in many cases been the thin end of the wedge that has caused the government to open undesirable townships for location, and their claims should not be recognized by the government, in fact they should be prevented from settling at all on the timber areas.

If we compare the present value of a mile of standing timber with an equal quantity of farm land to be found in the timber belt we will see at once the wisdom of preserving this area for timber, and keeping the farmer, who can only make a precarious living there at the best, out of it.

Ontario is just now opening up some five or six million acres of good land in the clay belt, where the timber is not valuable, and where there are farms for all who wish them. If the government would use as much effort in directing would-be settlers to this territory as they do for finding excuses for them to locate in the timber belt, where they can steal timber from the lumbermen, this country would soon be quickly settled.

At the last sale of timber by the Ontario government the license to cut pine timber only on certain berths sold for as high as \$31,500 per square mile, and the average for the 876½ miles sold was \$4,461.38 per square mile. Recently the timber on one square mile was sold at a price that, it is estimated, will give the government in the neighbourhood of \$100,000 for the pine only standing on the one mile, or 640 acres. This gives an average of \$156 per acre, leaving out all woods other than pine. With timber worth these figures and the land on which it grows of little value, who can doubt the wisdom of keeping all of our timber land for the growing of timber and confining the farmer to lands where the timber is not valuable. Several changes made in the conditions of the last timber sales have tended to accelerate the destruction of timber in Ontario. One of these was the cutting up of the area sold into small blocks. Instead of selling whole, unbroken townships, as had previously been the practice, the area was divided into blocks of from four to nine miles. With such small isolated berths the only practical thing for a lumberman to do is to remove the timber as soon as possible and to take it clean. On the other hand, when a man has a large block of timber in one place, he cuts it much more carefully as it would take him some years to go over the berth. And if he has been careful of his small timber he will be able to go back and cut over the berth again by the time he is through the first cutting. In fact, I, in my own experience have gone three times and even four times over the one berth, and had a good cutting of timber each time. This is not possible with small limits. The other condition of the sales referred to was that which only gave the licensee a limited number of years in which to remove the timber after which time the license reverted to the Crown. Naturally the licensee cuts everything of any value to him upon the land before his license expires. If the timber had been sold as of old, so that one man could purchase a large area in one block, with his own time to remove it, and no settlers to bother him, what would have been the result? Under these conditions he would be glad to cut the timber so as to make it last as long as possible, and, if proper care was taken, and a limited area cut over each season the limit could be made practically inexhaustible. The government would have been justified where they sold the timber lands in large areas in placing conditions as to the cutting of trees of a certain size, and for the prevention of fires, which they would not have been justified in placing on the limits where they were sold in small blocks and for limited periods.

There is one other action of the government that has been very detrimental to the preservation of the timber in certain localities, that is, the granting of concessions to cut pulp wood over large areas, and afterwards selling the pine licenses for the same land. This at once started a race between the two license holders, as to which would be the first to cut this timber. Up to the present the general public, and I am afraid the government, have looked upon the forests as something to be got rid of as soon as possible so that the land could be used for other purposes. No crop which could be raised on land in the timber belt could possibly pay for the destruction of the timber caused by the clearing of the land. I think I am well within the mark in placing the valuation of the timber crop at ten times the value of any other crop which could be raised on this land.

All these different actions on the part of the government show how utterly impossible any attempt on the lumberman's part to preserve the forest has been in the past. With the exception of the formation of the timber reserves, the regulations for the suppression of forest fires, and the manufacturing clause recently placed in the licenses, every action and move on the part of the Ontario government has tended towards the depletion of the forest and in the most wasteful manner.

All we can do now is to see how the present state of affairs can be remedied or improved upon in the future. I for one am free to admit that I do not see just how this is to be done, at least in the older districts. Things have gone on so long under the present conditions, and so much damage has been done, that it will be next to impossible at this late date to repair it. The suggestions which I have made in the earlier part of the paper would, no doubt, help; but would they, under the present conditions, fulfil the object which I take it we are all here to endeavour to fulfil,

namely, an assured supply of timber in the future. I think much can be done by replanting. This work must necessarily fall largely upon the government. There are townships which have been cut over and from which all valuable timber has been removed and which, on account of the poor quality of the land, contain very few settlers. These townships could be purchased from the licensee, and the settlers on them bought out for a very small sum by the government and then added to the present reservation. Replanting could then be undertaken by experts. In the course of 25 or 30 years, large areas of valuable timber should be the result. The government will no doubt have to decide upon a well thought out policy for the regulation of the forest reservations referred to. They might possibly sell the right to cut timber on these areas under regulations similar to those of Germany and other European countries, that is, of allowing only say one-twentieth of the area sold to any one party to be cut over each season, and a similar area planted with young timber. A great deal in this line might also be done by the holders of timber licenses, if the government would take steps to protect them and allow them to reap the benefits of the necessary expenditure by making the licenses perpetual, and keeping all settlers out of the territory. Although the lumberman, as a rule, has no quarrel with the bona fide settler, still I think the country would be much better off if all settlement were stopped in the timber areas, and the settler put on good arable lands. He could not only make a better living, but add much more to the economic wealth of the country, at the same time saving to the country the timber he would otherwise have destroyed if located in the timber belt. Much, I understand, is being done in the way of reforestry in the upper peninsula of Michigan. The country there is very suitable for this purpose, as there are large areas of sandy plains which are useless for agricultural purposes, but which are very suitable for the growth of pine timber. We have few such areas in this country. The Trappist monks at Oka have been experimenting in the line of reforestation on lands similar to the plains of upper Michigan, and I understand are in a fair way of making a success of it.

I have not touched upon the questions of the destruction of timber by fire and its prevention, and the difficulties that some limit holders are now experiencing through miners and prospectors burning the forest floors so as to be better able to search for minerals, or the injustice done limit holders on account of the military grants. These subjects have, and will no doubt, all be dealt with by others more competent to speak on them. In the past the lumberman has generally been counted the sinner, and I am glad to know that the public has come to see that he is more sinned against than sinning.

On behalf of the Lumberman's Association of Ontario, I want to express my gratification of the work being done by this association, and to assure you that the lumbermen of Ontario will do all in their power to further the aims so much desired by all of us.

FORESTS AND LUMBERING IN NOVA SCOTIA.

F. C. WHITMAN, PRESIDENT, WESTERN NOVA SCOTIA LUMBERMEN'S ASSOCIATION.

Nearly three hundred years ago a pioneer who landed on the shores of Nova Scotia, having strayed but a short distance from the shore was lost in the woods for several days. After all these years a man unacquainted with forest lore might easily find himself straying, if not actually lost, in the same territory, for the forest is there to-day.

Where civilization has had a more complete influence it is true the forest has disappeared and given place to cultivated lands ; but, in the famed Annapolis valley, the original forest is being replaced with fruit trees that extend from year to year in increasing number until ultimately the valley will represent a forest of apple trees, at

least that is what enthusiastic orchardists expect; and then pushing on the apple trees may reach the higher slopes and distant smaller valleys, where to-day the spruce trees occupy the land. It is rather curious to note in western Nova Scotia that there are many spots cleared by old settlers and planted with apple trees that have gone or are going back into forest again. For the green wood is the master when the hand of man is stayed. The apple tree in Nova Scotia of native stock bears fruit for one hundred years, and even at that full age will respond to cultivation. But, it is questionable if a spruce tree after one hundred years of growth increases very much in value. I think it is to be noted that very much of the old forest growth of Nova Scotia is apt to be dry standing timber and having reached that state rapidly deteriorates. It is of rare occurrence to walk through a forest of hardwood and find it vigorous and thrifty, presumably it is the exhaustion of the soil that causes the trees to begin dying at the top and gradually the whole crown dries up and the tree becomes worthless, even for firewood. Perhaps this is more noticeable in hardwood than in the green woods, for the reason that there has been little lumbering done, the principal cutting having been of pine and spruce. In fact, a paying commercial use for Nova Scotia hardwood has not yet materialized.

The vigorous growth of hardwood, oak, beech, birch and maple in its early stages gives a porous sappy wood that seriously interferes with its use for flooring, finish work or furniture, and the older growth is found to be defective in quality and difficult and wasteful to manufacture. With green wood, like spruce, pine and hemlock it is a different proposition and a greater value; in fact, the value of the green wood forest of Nova Scotia is greater to-day than it has been in the past, notwithstanding the vast amount of wood that has been cut. Its rapid growth, natural reproduction and increasing value of lumber in the markets of the world is interesting to timber land owners in a way that twenty years ago would not have been the case. In early days it was cut all and leave nothing, and the circumstances almost demanded it, for values were then half of what they are now, manufacture of the slowest and transportation not what it is to-day.

We have jumped in twenty years from a mill cut of 10-20 million feet per day to one of 50-100 per day. The old consignment market has about passed away and an order business taken its place. The mysterious terms of F.O.B., C.F., C.I.F. and C.O.D. have become more familiar. Sight drafts have taken the place of long time notes, and sellers and buyers have become a closer business community. Ports that looked upon a vessel carrying 300 million as a large transport, now use vessels of 600 to 1,000 million capacity.

During the last five years there has been a healthy advance in the value of forest lands, and firms controlling large tracts of timber seem to have been all impressed with the idea of adding to their holdings and establishing their business on a permanent basis. Unfortunately while conserving their own timber, many of them have bought timber from small holders who have stripped their lands. But, on the whole it may safely be said that there will be no such waste as in the past, and with systematic cutting the present holders of timber limits can work their lands almost indefinitely; provided they can fight successfully the enemy, and that enemy is fire.

Several years ago, protection of forest from fires was taken up by the Annapolis Royal Board of Trade. The difficulty was to formulate a system adequate to conditions and having equitable taxation.



FOREST RESERVE NEAR BRANDON, WHERE THE FORESTRY BRANCH IS ASSISTING REPRODUCTION BY PLANTING SCOTCH PINE.

The government had disposed of most of the original timber areas by grants, and the remaining 1,500,000 acres were scattered throughout the whole province, and represented the leavings and waste lands that the buyers did not consider worth purchasing at 40 cents per acre. The government therefore claimed that it would be impossible for them to bear the whole expense of fire protection. It was estimated that lumber firms owned about half, and small holders like farmers and those living on freehold lands in the forest district owned the half of the remaining standing timber in Nova Scotia. To those living in the back country and depending wholly on their wood lots for a living, protection from fire meant a good deal, and fortunately the lumber firms also looked upon the matter favourably, and voluntarily agreed to pay a tax to support a system of fire rangers. The Lumbermen's Association of Western Nova Scotia drew up and submitted to the government a comprehensive and practical plan for fire protection in Nova Scotia, and in 1903-4 an Act was passed by the legislature amending a previous Act of 1900, and established a system of fire ranging in any county or municipality that was willing to adopt it. This Act has now been adopted in most of the counties having forest lands, and has worked and been the effective means of preventing fires, in fact, since its operation no serious fires have occurred in Western Nova Scotia.

In the past, forestry in Nova Scotia has not been given much thought. The government of the province was too lenient in disposing of the timber lands, and should have kept control instead of making absolute grants. The cutting of the best timber and fire have depleted lands that to-day should be valuable, and they might be made so by reforestation. At the present there are signs of a greater interest being taken by the government of Nova Scotia and by lumber firms in forestry. The timber owners feel more assured under the present Act of 'Protection of Woods against Fires,' of their holding being protected, and more inclined to conserve their cuttings and let the smaller growth reach maturity. The future gives promise of attention being paid to forest values, more conservative cutting, and with natural reproduction and protection there is every reason to believe that forest wealth will continue to be one of the most important assets of the province of Nova Scotia. There is still to be solved the best method of reforestation in Nova Scotia, the kind of trees to plant and who will undertake the work. It would appear to be a proposition that the government should take up, and as they own 1,500,000 acres there is ample area on which to begin such a work, and there is no doubt the government could again acquire title to a large number of old grants and cleared holdings of private parties at a nominal sum per acre. A practical forester by going carefully over the situation could no doubt give valuable information and probably formulate a scheme that would work out successfully, and be beneficial to the lumberman and to the province of Nova Scotia.

At the suggestion of the owner of the land I went to see a small tract of second growth of pine and spruce lying within a short distance of Annapolis Royal. This land, between four and five acres in extent, was cleared of timber, burnt over and seeded to grain and potatoes thirty-two years ago. The road to the land runs up the side of a hill north and south, and the land cleared lies on a slope to the westward. When clearing the land near the top of the slope a small pine about three-fourths of an inch in diameter was left, as it was standing in a little cleared space by itself; to-day this pine is a

tall tree 16 inches at the butt, and would give a log 13 feet long, 10 inches at the top. As far as I could see this tree had not seeded any of the near-by land, probably owing to the fact that the leeward side is thick spruce woods. Then in the middle of a lot on the western boundary an old growth heavy-limbed pine was also left standing, and from this tree spreading out in a fan-like shape to the eastward the ground has been thickly seeded with young pine. The seed for the most part carried about 75 paces in a direct line from the old tree, and only to the edge of the road on the east side of the clearing where a growth of spruce had sprung up, following the line of the road north and south. In a few places the seed had carried across the road. I should judge that the farthest young pine was 200 paces from the old tree and about two acres was thickly covered with young growth. Where a young tree got the light and the sun it was much larger than in a thick growth. I measured a tree 11 inches at the butt, and 12 feet high it would go 8 inches in diameter. In the groves the young pine was very thickly seeded and the trees were from 6 to 9 inches in diameter. A grove of spruce along the road had outgrown the pine, for one reason it got more light, and trees were to be found 14 inches in diameter and running up into logs. All this growth has taken place within thirty years, and on land that was cleared and crops taken off. The pine originated from one old growth tree, and the spruce trees also came up from seed. I measured this year's growth on the young pine and found it to be from 1 foot 6 inches to 1 foot 8 inches.

THE LUMBER INDUSTRY OF BRITISH COLUMBIA.

C. M. BEECHER,

Representing the British Columbia Lumbermen's Association, Vancouver, B.C.

When I accepted the honour of acting as delegate for the Lumbermen's Association of British Columbia I had no information that an address would be expected from me. On the contrary it was definitely stated that my fellow lumber manufacturer, Mr. Jones, was to speak upon the subject of the lumber industry of British Columbia. It was only yesterday that I was asked to speak upon the subject, and I must ask your forbearance, if in a certain measure my remarks are of necessity of an extemporaneous nature and not of that definite character which this occasion demands and which this representative audience has the right to expect. I will confine my remarks particularly to the lumber industry of the coast. Of the subjects brought before this association the question of injury to agriculture from the denuding of the hills, water courses and watersheds of forest does not at the moment apply to the coast of British Columbia for the reason that the watersheds, hills and mountains up to the snow line are covered with a dense growth of forest. Most of this growth, particularly in the upper portion of the hills and mountains, will not, probably for generations to come, be of commercial value. This also applies to the question of affecting the water-powers in British Columbia. The question of tree planting or reforestation or of extending the timber areas of British Columbia on the coast is not a question of economic interest at the moment, for the reason that, as many of you probably know, the timber area is very vast and growth very thick. As a matter of fact wherever timber claims have been logged over, where fire has swept through the limit and where nature has been allowed to do its work there has been a natural re-sowing, and the same trees are growing up in the forest again, namely, the Douglas fir, spruce, cedar, and hemlock.

You are all aware of the peculiar conditions of the lumber industry in British Columbia. It is generally supposed that our timber resources are inexhaustible. If it is a mere question of timber trees or forest trees, I quite agree that our resources are inexhaustible, but if it is a question of merchantable timber, I regret to state that as far as our information goes now the timber resources of British Columbia are limited. I think it is within the scope of this convention to consider not only the question of the preservation of our forests, reforestation and tree planting, but also the question of the economical and profitable use of the timber that we now have. The lumber industry of British Columbia is peculiarly situated. It has to face conditions unknown in the older eastern provinces. At the moment it is a matter of regret to the lumber manufacturers and timber owners of British Columbia that they are forced to take from their timber limits a very small percentage of the trees growing on those limits. Still further, owing to their conditions and their situation, they are only able to ship what is practically selected lumber and therefore they are neither able to properly use their timber limits nor to run their mills. The burning question, therefore, with the lumber mills of British Columbia to-day is the question of market and of widening and extending the outlet for the product of the lumber manufacturers. In this connection I am happy to call your attention to the fact that it was our Premier, Sir Wilfrid Laurier, who first offered to the mother country the preferential tariff concession. This is a concession which I hardly think our friends on the other side of the water appreciated at first. I think they have reason to know that this was an act of statesmanship the results of which we have not yet seen. Still further this same preference was offered to sister colonies, and it has been adopted with beneficial results by South Africa and by New Zealand. It is under consideration by Australia. Now, gentlemen, following up this line of thought and bearing in mind the necessities of the lumber industry which I have the honour to represent, I might express the hope that with the fiscal changes which are going on in the mother country a preference will be given to lumber manufactured in the colonies of the Empire. The result of this it is not necessary for me to point out to any lumber manufacturer, in this audience, but the particular result to the lumber industry of British Columbia would be immediate. Think for one moment what it would mean if there were a preferential duty charged on white pine shipped from the Atlantic states of the United States, on pitch pine shipped from the gulf States, or the southern States, on redwood from California and Douglas fir from Puget sound. Still more important would it be, if, under the present government of the Commonwealth of Australia, called the Deakin government, and known to be in favour of the preferential policy on lumber, on agricultural machinery and on many products of Canada, a preferential tariff was given. If a 33½ per cent preferential tariff were applied to lumber shipped from a sister colony into Australia it would mean a difference of \$1.25 a thousand on every cargo shipped from British Columbia in competition with cargoes shipped from Puget Sound. Possibly few of you realize what has happened in that market. As a matter of fact Australia is one of the oldest markets supplied by the mills of British Columbia, but during the last few years the shipments from Puget Sound have been 75 to 90 per cent and the shipments from British Columbia about 10 to 25 per cent. Under this preferential arrangement that should be changed around.

There is still another point, and I think it is quite within the scope of this convention to take note of it. I refer to the proper use of our forests. I maintain that in

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the specifications for the construction of all the public works of the Dominion, canals, harbour improvements, public buildings, and railways subsidized by the federal government, it should be specifically demanded that the material to be used should be the product of Canadian forests and Canadian mills. I do not know that at this time it is necessary for me to speak to you regarding the suitability of Douglas fir. At one time it was necessary to almost personally follow every car that was shipped to the east in order to meet and overcome the influence which was exerted against the introduction of a new material. That time has definitely gone by. We sometimes, however, like to receive unsolicited testimony, and if you will bear with me for a moment I will give one or two instances. In the early nineties a representative of the Puget Sound mills opened a selling agency in London. Their advertisement in the *Timber Trades Journal* read: 'Cargoes of Oregon pine from Puget Sound.' Shortly after that the firm with which I am connected also opened a selling agency in London. Our advertisement in the same journal read: 'Douglas fir from British Columbia.' It is rather gratifying for me to be able to say to you that in the course of a few years, owing, I claim, to the superiority of the shipments from British Columbia, the advertisement of the Puget Sound Mills had to be changed to read: 'Douglas fir from Puget Sound.' I have a little more unsolicited testimony. Some years ago, as you are aware, under President Cleveland's administration in the United States, the Wilson Tariff Bill was enacted. Under this tariff lumber was allowed to be shipped from Canada into the United States free of duty. When, however, President Harrison was elected, in 1896, a congressional committee sat on Puget Sound with the avowed object of getting reasons for doing away with the Wilson tariff and enacting the Dingley Tariff Bill. It was with considerable amazement and gratification I may say, that we read the testimony given before this congressional committee while sitting at Seattle and Tacoma. The burden of this testimony was that the timber resources of British Columbia were inexhaustible, that their quality was far superior to that of Puget Sound, that the mills in British Columbia were better equipped and more cheaply operated than the mills on Puget Sound, and that unless a duty of \$2 per thousand were put on the statute books the lumber industry of Puget Sound was doomed.

The immediate effect of this widening of the market for the lumber manufacturers would be patent to every one of us. At the same time, unless you gentlemen have been familiar with our operations in British Columbia, you can have little idea of the wonderful difference it would make to us if we could properly log our timber claims, and if, instead of taking some 30 per cent of the timber we could take 60 or 70 per cent. Still further, you can realize what it would mean to us if, instead of having to study the conditions of the market and to select the output of our mills, we could find a ready sale and a proper market for all our lumber. I wish particularly to emphasize the fact that if what I suggest is done it would be possible for the lumber manufacturers of British Columbia to supply the farmers and settlers of the North-west with lumber at rates which will satisfy even the Manitoba farmer.

On the question of fire protection, in common with those who have attended the sessions of this convention, I have been very much interested in the amount of progress that has been made in the eastern provinces. I am happy to be able to bear testimony personally to the satisfactory results that have come from the administration of the Forestry Department of the Dominion under the able superintendence of Mr. Stewart and his lieutenant Mr. James Leamy. I can speak regarding these gentlemen because

my company have timber limits in this railway belt, and since the inauguration of this careful fire service there have been very few fires in that region, and those that have started have been controlled and handled so as to minimize the loss. I regret to say, however, that this action has not been taken by the provincial government of British Columbia, strange as it may seem, as they are the largest owners of timber in British Columbia. Apropos of this your secretary has handed me a letter from the president of the Associated Boards of Trade of eastern British Columbia, and as I am upon this subject, I will, with your permission, read it:—

ASSOCIATED BOARDS OF TRADE OF EASTERN BRITISH COLUMBIA,
KASLO, B.C., December 19, 1905.

SIR,—The Kaslo Board of Trade has asked me to acknowledge on their behalf the receipt of your letter of November 15, in which you invite them to be represented at the meeting of the Forestry Convention on January 10.

The Kaslo Board of Trade regrets that it will probably be unable to send a delegate to the convention, and it is, I fear, probable that none of the boards in our association will be directly represented.

The destruction of the forests which those of us who live in the Rocky mountain regions have been compelled to witness going on around us for the last sixteen years (since occupation by white men began here), has given us great anxiety.

We recognize in it an evil that must be coped with by governmental action. We fully recognize that restrictions in regard to the setting of fires, must in order to be effective be stringent, and that their breach must be punished with drastic penalties. And we also recognize that adequate supervision must be costly, but we believe that the enormous importance of the object aimed at justifies extreme measures.

At the last meeting of our association, February 23, 1905, the following resolution was adopted:—

‘That in view of the serious and extensive forest fires that have occurred in the province in the past, and especially in the year that has just closed, whereby many large areas of valuable timber have been destroyed, thus materially lessening the natural resources of the province;

‘Therefore be it resolved,—that the provincial government be strongly urged to appoint a sufficient number of competent paid fire wardens, and take every step possible to prevent the recurrence of these disastrous and destructive fires.’

I may say that a competent fire warden was appointed for the Kootenay Lake and adjacent districts, and was on duty during the dry months. He was, however, single-handed, apparently without authority to employ instantly on occasion, ample assistance. He complained moreover that the provincial statutes that made it impossible to convict a party responsible for the origin of a fire, unless it could be shown that the party had not taken ‘reasonable precautions,’ rendered prosecutions futile.

At any rate the summer just passed has been one of the worst in our experience for forest destruction, and we see that unless more effective measures are immediately taken that there will soon be no forest in Southern British Columbia to preserve.

We shall hope to see as a result of your meeting, the governments of the Dominion and of the different provinces moved to co-operation in a programme of radical reform in this matter.

I am, sir,

Yours sincerely,

G. O. BUCHANAN,
President Ass'd B'ds of Trade, E.B.C.

I trust that very strong resolutions will be passed by this convention not only strengthening the hands of Mr. Stewart and the forestry division, but also urging upon the various provincial governments the urgent necessity of taking immediate action so that this enemy of our forests may be properly coped with.

THE LUMBER INDUSTRY AND THE FOREST.

By WM. LITTLE, WESTMOUNT HEIGHTS, MONTREAL, PAST PRESIDENT OF THE CANADIAN FORESTRY ASSOCIATION.

When considering this very important subject, the lumber industry and the forest, owing to the limited time assigned for reading papers, I will confine my remarks chiefly to what may justly be called that great trade abomination, the free export of Canadian logs, lumber and timber to foreign countries, frequently at prices less than the cost of production and delivery to market, and especially to the United States, a country that has been getting from Canada for many years all timber products free, while exacting duties on all similar products except logs and pulpwood. This is a branch of the lumber industry of which I have a fair knowledge, my father and myself were engaged in it extensively for over fifty years, my father being the first to export lumber in quantity to the United States from South Ontario, and owing to the wasteful manner in which operations were conducted by all lumbermen at the time has divested the forests of our eastern provinces—Ontario, Quebec, New Brunswick and Nova Scotia—of nearly their whole stock of mature white and red pine, oak and ash timber of large size and good quality south of the line of the water shed of the height of land, without returning to the country a single dollar for the stumpage value of the thousands of millions of feet of our most valuable timber, so imprudently sacrificed during the past century.

And although we should not feel any great concern at parting with this timber if the country got any fair compensation for it, nor should there be anything but satisfaction for its consumption in the country which went to supply our own people with homes and other buildings, and also to supply our manifold wants for which timber is so indispensable, one cannot well look with unconcern on a policy that has led to a total loss of this large amount of valuable timber without any financial return whatever. I have restricted the time to the beginning of the present century, 1900, since for the past six years prices have risen in our eastern markets, at the rate of fully ten per cent per annum where losses were very frequently the case in previous years, due to the constant over-production of lumber and timber as long as supplies could be had without difficulty, and I regret to have to say that it is scarcity of good timber from which to manufacture lumber rather than the prudence of the lumbermen, that has brought about the present satisfactory state of the trade in the east; while in British Columbia, and elsewhere in the west, where plenty of timber is yet to be had when wanted, constant over-production is still the first order of the day, and is naturally producing its well known evil effects.

Timber that would have returned many hundreds of millions of dollars to the lumbermen and the country, if it had been prudently administered, was needlessly and wastefully sacrificed, without profit to either the lumberman or the country; for I am satisfied that an inquiry into the conditions would disclose the unpleasant fact that the losses made by the great majority of those engaged in supplying this export trade with wood products during the past century, have far exceeded the profits made by the few who were successful; and that many of our most enterprising men, instead of being engaged in some remunerative business of advantage to themselves and the country, have been simply wearing out their lives and exhausting their capital and energy in wasting, to no good purpose, one of the country's most valuable assets, and almost invariably to their own financial ruin.

I know it may be truly said that there are a number of wealthy lumbermen in the country, but their number is not great when the vastness of this trade is considered, and many of these would doubtless admit that most of their wealth was derived more from not lumbering than from lumbering—from taking advantage of the ignorance, indifference, as well as improvidence of the different governments to acquire vast areas of the public timber for the merest trifle of its value, and as time rolled on the increased price of this timber, which should have by right inured to the public bene-

fit to reduce the country's indebtedness and relieve taxation, has through the imprudence of successive governments passed into the possession of the lumbermen, who now control nearly all that remains of the merchantable good, old white pine—the most valuable timber tree in the North American forests. As a case in point, I may relate a reference to this matter made by a highly respected and wealthy retired old Ottawa lumberman, who said that his firm bought timber limits for \$20,000, from which they cut \$200,000 worth of timber, and then sold them for \$750,000, thus getting in a few years nearly fifty fold their original cost, and the licensee got the benefit of this increase in price instead of the public, and similar instances are by no means rare. In order to show what great changes in values have taken place during the business life of a single individual, I may say that I have myself seen white pine sawlogs that were delivered to my father's mills in Caledonia on the Grand river at 25 cents each which would now be worth \$25 each, or one hundred times as much; and the timber on fifty acres of land adjoining the town plot of South Caledonia, (which belonged to him), that he bought for \$100, would now sell readily at over \$100,000, or more than one thousand times its cost at the time. And when endeavouring to impress upon our own manufacturers, as well as those of Michigan, the sacrifices they were making of both their timber and capital, my father in 1880 drew their attention to the financial prudence of a Michigan lumberman, who it will be seen made more money out of timber by not lumbering than by lumbering, when he said, 'I have watched the course pursued by lumberers of both the United States and Canada, and it has been reckless in the extreme. A Mr. David Ward, of Michigan, is the only one among them who, it appears, is able to take a commonsense view of the question of supply and demand. While others have been slaughtering away their timber and labouring hard to get rid of it, as if of no value, he has been quietly picking up the most valuable lots, and has now, I am informed, secured in Michigan, Wisconsin and Minnesota some 2,500,000,000 feet board measure, and this he has been able to secure at a comparatively insignificant outlay, and with but little trouble or anxiety to himself.'

I may say that if Mr. Ward's estate still owns this large amount of pine timber it would be able to buy out fully one-half of the manufacturers of Michigan, for it would be worth over fifty million dollars, a sum far in excess of all the profits made by all the lumbermen in all the provinces of Canada in the production of lumber and timber for export during the last century. Indeed I have heard that his executors have been offered, and declined the offer of four million five hundred thousand dollars for three hundred million feet of this Michigan pine, or less than one-eighth of the quantity stated, being at the rate of fifteen dollars per thousand feet stumpage, and such timber would be worth fully fifty per cent more to-day.

This is another instance where more money was made by not lumbering than by lumbering. So that an investigation into this matter would show that, instead of Canada having found a great source of national wealth in the export of her choicest timber, as she should have done, and doubtless would have done, if lumbering operations had been prudently conducted, and the governments had not been actuated by a senseless desire to get rid of the timber in advance of the real demands of the trade, the contrary has been the case, and her export timber trade has resulted simply in the total loss of the timber exported, a recklessly extravagant waste of one of our most valuable resources that would have been worth if standing in our forests to-day many hundreds, if not thousands of millions of dollars.

It was a knowledge of the steadily rising price of timber due to the growing scarcity that drew my father's attention over thirty years ago, to the folly of sacrificing such valuable property without getting adequate returns, and caused him to protest against what he considered to be the imprudent and improvident maladministration of their Crown lands by the governments of Ontario and Quebec, in auctioning off their timber in advance of any real demands from the trade, and consequently getting inadequate prices for it, to the great loss of the country as well as to the lumbermen, by bringing in fresh operators to increase the overproduction of lumber and lessen the

price to below its cost of production; my father's contention being as true then as it is now, that the eastern provinces of Canada had no such surplus amount of good timber that they could afford to part with the best of it for a tithe of its value, which is now generally acknowledged to have been the case.

From the very able and exceedingly valuable report made by His Honour Sir Henri Joly de Lotbinière, as a member of the Dominion Council of Agriculture, to the Minister of Agriculture, in 1877, it would appear that his views, while not so strongly expressed, were very much in accord with those of my father on the imprudence of the lumbermen, and the necessity for the government taking greater care of the forests. And the second paragraph of his report refers to a matter of almost supreme urgency, that is to a proper inquiry into the state of the forests, wherein he says: 'Before entering into the question of forestry, or the management of forests it appears logical to inquire, first, into their present state.' And this is to-day the most important question before us to ascertain as near as possible "the present state of our forests," which he even then, nearly thirty years ago, summed up in his conclusions by saying "that it is very far from satisfactory, and leaves much room for improvement, we have not been spending the income or annual profit of our forests, but the forests themselves—not the interest but the capital."

It is now full time that this timber supply question should be brought directly to the front, for I know the Canadian public is living in a fool's paradise in not insisting in the strongest possible terms on getting some knowledge from the government of 'the present state of the forests,' and why it is, if we now want the most ordinary lumber for house building or other uses, that with which we are all acquainted—the good old-fashioned whitepine, unembellished with knots, rots, worm holes, gum streaks, sap stains or shakes, we are asked if Douglas fir from the Pacific, or pitch pine from the Gulf of Mexico, or some kind of hardwood, running in lengths of two feet and upwards, won't answer as well?

Our Crown land officials tell us that we have thousands of millions of feet of good pine timber in our forests, but why can we not get it from the lumber yards to-day at reasonable prices? My nearest neighbour, who is one of the most extensive builders and lumber dealers in Montreal, who should know where to get good lumber cheap if any one did, told me last year when he started to build his house that he had to get the lumber for his floors and the shingles for his roof from Vancouver, and bring it nearly three thousand miles by rail. Where to? To the city of Montreal; at the mouth of the great Ottawa river, which drains 80,000 square miles of our best pine timber country, and that the lumber for his doors came—the oak from Indiana and cypress from Louisiana and the Gulf of Mexico, so that it would appear we are now in our eastern cities about in the same condition as Michigan, that, like ourselves, boasted only a few years ago of its inexhaustible forests of white pine. In the report of the Michigan Forestry Commission for the year 1903-1904, page 87, I find the following: 'Agriculture far more than supplies the needs of the people, and it is now and always will be the greatest industry of the state. The second greatest, the wood working industry, but a few years ago found an ample supply of raw material and its output went to the markets of the Atlantic and to the plains of the west as far as the gulf. This is changed, the lumber industry has largely gone from the state; of the large capital invested in this industry in 1890 only about one-half was so invested in 1900, and instead of Michigan being one of the greatest export states of lumber in the world, we are to-day importing timber and lumber. The Seattle cedar, the California redwood, the cypress from the gulf, the pine from the Carolinas and the South Atlantic are filling our lumber yards, and our people are paying every year large sums of money for a necessity which in our state we should never have to import, but should be able to export for centuries to come. Our people in paying this fine for short-sightedness and careless misuse of the greatest natural resource already in the state, are paying out not only for the material, but are also paying for the shipments, partly at least, over the two great mountain systems of the new world, and in all cases for long distance railway transportation, little coming less than 1,000 miles, and a

very large amount over 2,000 miles distant. The wood working industry of our towns, notably the manufacture of furniture, which has added so much to the building up of some of our towns, finds no longer a home supply, but is going as far as Arkansas and Tennessee for its raw material, and the enterprising manufacturer is exposed to the severest competition, and is in danger, at all times, of being ruined by the competitor, who is located at the source of these supplies. What a loss this is to the state may be inferred from the census statistics of the lumber industry. In 1890 this industry employed 129 millions of dollars, in 1900 only 67 millions, and while it might be held that this decrease meant only a change in employment it is generally known that this is not the case, but that the Michigan lumberman has gone south and west.'

And a letter I have just received from a dear old friend, Mr. George W. Hotchkiss, dated Chicago, January 3, 1906, a gentleman whose name is held in the highest respect by all who have the pleasure of his acquaintance, and one of the best known timber land and lumber statisticians in America, who in his true genial manner notes the altered condition of the great lumber market of Chicago, whose annual imports equal about the whole sawn lumber product of the Dominion of Canada, in which he says: 'I have lived to see the day prophesied by both yourself and me when the forests of the North-west would no longer ring to the axe of the lumbermen cutting what to us comprised the only lumber of which notice was then taken, the good old white pine. We were miserable "denudiated" in those days—prophets of an evil "which would never come even to our children"—but which has now come to the great grief of the nation. Little did even you or I imagine that we should live to see the day when common lumber would be graded down to even a No. 6, requiring a man at each end and one in the middle to put in the pile. Times are not as they used to be, friend Little." Of the two billion feet reaching Chicago in 1905, the largest half was the despised hemlock, with maple, beech, sycamore, elm, southern and west coast, New Mexico and Idaho making up the other half, with, of course a sprinkling yet of gleanings of white and Norway pine picking perhaps two to five per cent of better than common.'

Under such circumstances, and especially when aware that the great white pine forests of the United States, which had hitherto furnished the bulk of the stock to supply the markets of the northern, eastern and middle states of the American Union were about gone, and they would now be forced to look to Canada for supplies of this indispensable material, one would naturally have thought that the time had arrived to exercise a little wise selfishness and to withhold our timber from sale until we got full compensation for one of the most necessary and generally useful of nature's products with which Providence had so bountifully supplied us. But, instead of this, we find those entrusted with the management of our forests—the most valuable product we possess—wasting it with a craze of prodigality that is simply appalling, timber that would cost hundreds of dollars an acre to grow, even if we could afford to wait two or three hundred years for its maturity, is still alienated in blocks of 25 square miles, or 16,000 acres each, for comparatively trifling sums, and often to the extent of millions of acres at a time. Not satisfied with having already sacrificed the best of our pine and other commercial timber till we have not as much left as prudence would advise we should keep for our own home requirements, our Quebec government, having discovered a plausible excuse therefore in the pulpwood trade, would seem to have entered into a contest to see how it could soonest divest the province of its spruce, the most valuable commercial timber now remaining in excess of our domestic wants. And this not only of merchantable sizes, but also the mere saplings down to 7 inches in diameter on the stump, that should be left to become the timber trees of the future. Thus outheroding Herod himself, and committing national suicide; as Sir Henri Joly de Lotbînère so wisely said: 'By destroying the young trees, which in a few years would replace the matured wood fit for logmaking one condemns the forest to a speedy death, just as a nation would be swept out of existence if every child was done away with in its infancy.'

And here I may say, with regard to this destructive policy of allowing the cutting of pine trees as low as 12 inches in diameter on the stump, and spruce trees of even

less diameters it would be hard to conceive a greater waste. These small trees should not yet be classed as timber trees at all, as they are mere sapling poles of comparatively little value, being composed chiefly of knots, sap and gum, and are consequently not worth more in the foreign market than the diminutive timber of Scandinavia and other parts of Europe, as well as Asia, of which there are still abundant supplies for many years. Their early life in the woods until they attain these diameters is most frequently simply a struggle for existence, till the tops and branches reach the light and air, without which, like human beings they cannot thrive; and it is then that their rapid and valuable growth really begins. They are simply the stocks on which the valuable clear wood is grown, and will, in a few years, if allowed to grow, add from ten to twenty fold to their stumpage value. And now that clear lumber which can only be got from trees of large girth is getting very scarce and is likely to increase in value rapidly for the future, this matter should receive most prompt attention from the government, and some arrangements should at once be made with the license holders to fix a stumpage diameter, that will in some measure tend to decrease the cutting of these small trees, or in a very few years our white pine lumber and timber trade will be at an end.

Knowing as I do that the timber question is by all odds the most important question of the day, and that a knowledge of the true state of our forests is absolutely necessary to a proper consideration of it, I trust this convention will respectfully ask the government to inquire into the state of the forests of the country, especially of the white pine, red pine and spruce, so as to ascertain as near as practicable the amount and quality of these timbers now remaining south of the water shed of the Laurentian mountains, designating that suitable for regular size deals, lumber and square timber, and that this committee should consist of those possessing some practical knowledge of forestry together with some practical lumbermen. And now I beg leave to say that after waiting for nearly a quarter of a century for some serious recognition of the importance of the question of forestry, it was with extreme pleasure as well as with very great relief I learned from Mr. Stewart that His Excellency Earl Grey was not only pleased to act as patron of the Canadian Forestry Association, but he also stated that he would be pleased to do anything further in his power to assist the work of this association, even suggesting, if thought desirable, the holding of an evening meeting at Government House; and this relief was raised to actual joy when this direct recognition of the question by His Excellency was followed by the announcement coming from Senator Edwards to our meeting in Quebec, that the Prime Minister of the Dominion, Sir Wilfrid Laurier intended to issue a call for a forestry convention to be held in Ottawa under the auspices of the Canadian Forestry Association, for I then felt that like the seed of the good old white pine, it had at last reached mineral soil, and would at once take root and grow until it, like the pine, towering above all the trees of the forest commanded universal recognition.

THE PULPWOOD INDUSTRY.

HERBERT M. PRICE, PRESIDENT, PROVINCE OF QUEBEC PULPWOOD ASSOCIATION.

The subject of pulpwood is one that has come to the front within the last ten years prominently from many points of view and has many collateral bearings and has, I believe, been instrumental in bringing the question of forestry as practical politics before the public.

DIMENSIONS OF WOOD CUT.

There is no doubt but that a smaller diameter of wood has been cut than is in the true interests of the pulp and paper mills to accept or the owner of private lands or limits to cut. Some twelve years since the diameter shipped was six inches and up, while now four inches and up is accepted.

The actual quantity of wood is less in a cord of four inches and up than in six inches and up, but competition between buyers has brought about this lower minimum. It would be much in the interest of the owner of timber lands to make only five inches and up, he would get a better price for his wood, his lands would not be so depleted and depreciated, the jobber could afford to make it at a less price and the paper mill could afford to pay more for it.

SORTS OF WOOD AND DIMENSIONS.

Practically there are three sorts of pulpwood: spruce (including balsam or sapin), hemlock and poplar, but this paper will deal generally with spruce, as quantities of hemlock and poplar are so small and do not materially affect the question now under discussion, and hemlock is cut primarily for its bark and not for pulpwood.

Pulpwood is divided into rough wood (wood with the bark on), peeled wood, hand-shaved wood and rossed wood.

Rough wood is made generally in the winter in whatever lengths are most convenient, being cut down to four feet before being shipped to the United States and sometimes to two feet. If trees are cut after winter sets in, same can be hand-peeled to advantage the following spring, as the sap will then run.

Peeled wood is peeled in the woods in June, July and August, and mostly cut into four-foot lengths and hauled out the following winter or driven the following spring.

Hand-peeled wood is generally peeled with a drawknife the following spring and summer, after being made rough in the woods and after being either hauled out or driven. The later in the summer it is so hand-peeled the harder the work is.

Rossed wood is the rough wood machine-peeled by a barker or rosser. The loss of wood in this case is greater than when it is hand-shaved, and may be estimated at from 20 to 30 per cent, according to the size and quality being peeled as, naturally, the smaller the diameter of the wood the greater the waste or loss.

Up to within the last two years the wood barker or rosser only barked sticks of wood not over two feet, but now the Moreau barker rosses four feet sticks.

CONTENTS OF A CORD.

The number of pieces in a cord of course varies greatly according to the size of the wood cut, but from actual measurement a cord averaging $4\frac{1}{2}$ inches in diameter takes 174 pieces; $5\frac{1}{2}$ inches, 122 pieces; $6\frac{1}{2}$ inches, 100 pieces, and $7\frac{1}{2}$ inches, 82 pieces, showing the extra labour and handling in cutting small wood.

In shipping wood by rail it is found that a cord of wood peeled one summer and shipped the following winter or spring weighs about 3,000 lbs. while unbarked wood comes near 3,800 lbs. per cord.

VALUES.

In speaking of values, of course, points of shipment and favourable rates of transportation by rail or water make the price, but I am taking points favourably situated in the Quebec district as a basis. The values of spruce pulpwood have gone up greatly during the past ten years, and especially within the last five. Rough wood that sold at \$2.50 a cord, 6 inches and up, in 1892, sold in 1904 at \$4.50 for 4 inches and up, but the demand for this wood has decreased, the mills preferring peeled or rossed, as they get apparently more for their money.

Peeled wood is sold from \$6 to \$6.50 a cord in conjunction with hand shaved.

Rossed wood has recently come into great demand, no doubt the mills having found it to their advantage to use it at the price they paid, say \$7 to \$7.25 per cord of 128 cubic feet cut into two feet lengths, four feet lengths not being in demand. The fires of 1903 in the Adirondacks and elsewhere in the United States, also in Canada, forced owners of stumpage so affected to utilize at once what wood was fit for rossing. This, no doubt, brought a surplus on the market.

Various percentages of balsam or sapin are shipped in with spruce pulpwood.

Stumpage on private lands well situated has practically doubled in the last five years and, consequently, the values of such lands have risen very greatly. Stumpage as high as \$10 an acre has been paid on favourable lots. Lands that 5 or 6 years ago had greatly depreciated by extensive logging operations were given a new value by the market demand for pulpwood.

MEASUREMENT.

In the Quebec district pulpwood is generally bought French measure and shipped English measure, the French cord being 8 feet 6 in. \times 4 feet 3" \times 4 feet = 144 cubic feet, against English cord of 8 feet \times 4 feet \times 4 feet = 128 cubic feet. The short way to bring one measure into the other is to deduct $\frac{1}{6}$ from French measure or add $\frac{1}{6}$ to English measure.

DISTANCES TRANSPORTED.

To show the distances transported and what an important part the north shore of the St. Lawrence river plays in the question of pulpwood, it may be mentioned that the Battle Island Paper Co., of Fulton N.Y., situated near Oswego, on Lake Ontario, draw the greater portion of their supply from part of the Saguenay river at Ha Ha Bay wholly by water, a distance of nearly six hundred miles.

Pulpwood is also shipped from Escoumains, some distance below Tadoussac.

QUANTITIES CONSUMED.

It is estimated that the United States consumes yearly about 2,500,000 cords of pulpwood, of which we ship them about 25 per cent.

During the past year the Adirondacks alone produced some 580,000 cords of pulpwood, equal to say 350,000,000 feet B. M. This cutting is practically at our own door and tells us that some day Canada will have much more to say as regards the supply, as prices of stumpage in the United States have gone to very high figures.

The Department of Customs at Ottawa inform me that the total quantity of pulpwood exported from Canada during the fiscal year ending July 1, 1904, was 479,238 cords. These figures, in conjunction with the information I give, go to demonstrate that the United States looks to the province of Quebec for a very large proportion of this 25 per cent.

There were 259,231 cords of pulpwood cut on Crown Lands in the province of Quebec in the year ending June 30, 1903, of which 70,576 cords were exported from Canada. I understand from the department that the amount cut for year ending June 30, 1904, was very similar to the foregoing year, but the returns are not yet published. Mr. J. E. A. Dubuc, in his pamphlet of the present year on pulpwood, states that from 720,000 to 750,000 cords are cut yearly in the province of Quebec, of which 300,000 are converted into pulp and paper for local consumption and export. These statements show the large proportion of pulpwood that is cut on private lands in the province of Quebec. The estimated amount of pulpwood cut on Crown Lands in the province of Ontario during the past year is 60,000 cords.

UNSATISFACTORY MANNER OF SELLING TO THE UNITED STATES.

There is much to be done to put the pulpwood trade on a satisfactory basis as between the seller in Canada and the purchaser in the United States, as the custom is now for the seller in Canada to take mill measurement, or final measurement, in the United States, in spite of the fact that wood is generally sold f.o.b. car or boat in Canada. The Pulpwood Association has discouraged strongly any sales made deliverable at mill in the United States, believing that debt should be one collectable on this side

of the line and that the United States mills should be responsible for changes in freight and also for any duty imposed by their government, the Canadian shipper being responsible for any export duty imposed by Canada. There is often much difference in measurement of boats and cars between Canada and the United States and same must continue as long as the present system exists.

DUTY ON PULPWOOD.

All pulpwood is admitted free into the United States at present, but about two years since the United States government commenced collecting 20 per cent duty on rossed wood, claiming under the Dingley tariff that it was a manufactured article. The payment of duty was protested by interested parties and the case tried before the General Board of Appraisers in New York which decided that rossed pulpwood was free. The government then ceased collecting but appealed and the case went before the circuit court in the district of Vermont, which affirmed the decision.

The government again commenced collecting duty on rossed wood in July, 1905, at 20 per cent on the cord valued at \$7 or \$1.40 per cord and immediately afterwards lowered the valuation to \$5.50, or \$1.10 per cord and ceased collecting on November 6 last in consequence of the decision of circuit court of Vermont in October last, but has again appealed and the case will go before the circuit court of appeals. The strong probabilities are that the government's contention will be set aside. The government has, however, not yet made a refund of duty collected.

PROVINCE OF QUEBEC PULPWOOD ASSOCIATION.

An association called the 'Province of Quebec Pulpwood Association,' of which I have the honour to be president, was formed in 1902, and I think well to quote from its constitution the reasons for its formation:—

'The object of the association shall be to promote the interests and conserve the rights of those engaged in the pulpwood business or in the manufacture and preparation of pulpwood, to hold meetings of the members for the consideration and discussion of questions affecting those interests and, by union and co-operation, to build up and foster the pulpwood business.

To inaugurate a uniform system of measuring and selling pulpwood to Canadian and American pulp and paper mills.

To assist in encouraging shippers to export only a good class of pulpwood so as to maintain a good name for pulpwood shipped from the province of Quebec.

To encourage the strict observance of contracts between producers of the wood, shippers of same and the mills in Canada and the United States who consume it.

To look after the facilities for shipment of wood given by railroads and water transportation companies.

To foster good-will between the shipper and the consumer and to be the means of removing differences between them.'

The association has, I believe, done and is doing good work on the above lines.

EXPORT DUTY.

The question of an export duty being imposed by Canada on pulpwood has been much discussed, but I feel that the safest course and the wisest one, is to let things remain as they are, for I believe this policy conduces to the interests of the many. We cannot afford to lose an export wood trade before a home market is found. This country's resources are so immense in pulpwood that we can afford for some time yet to export the raw material and until we are able to find capital to build up mills to manufacture and export the product; besides, the building of pulp mills in Canada, apart from paper mills, is not particularly encouraging at present.

When we consider the enormous and almost unlimited supplies of pulpwood derivable from the north shore of the St. Lawrence river alone, we can safely feel that this question may be left where it is for the present. New supplies are constantly coming into sight and I may mention the island of Anticosti as one of these and which will probably prove itself to be a shipper of pulpwood and pulp on a large scale in the near future. The country between Quebec and Hamilton Inlet, a distance of over 750 miles in a straight line, is a fair reserve for the future. We are not doing posterity a wrong as regards this question of an export duty by not agitating it now. Hon. Mr. Parent, when Premier and Minister of Crown Lands of the province of Quebec, in his speech on the pulpwood question, in April, 1903, stated that there were 62,592 square miles of Crown Lands under license and 100,000 square miles of absolute forest not yet under license, making 162,600 square miles of Crown timber lands amounting to 104,000,000 acres. Since that date the mileage under license has increased to over 67,000 square miles.

Besides the above there were some 20,000,000 acres of seigneuries and patented lots, the large proportion by far being timbered.

The immense quantities of pulpwood in the provinces of Ontario, New Brunswick and Nova Scotia supplement those of the province of Quebec.

The depreciation in value of timber in the event of an export duty would be very considerable, as the duty, in order to meet the views of its advocates, would have to be made heavy enough to make export prohibitory. It would also stop for an indefinite time the purchase by Americans and others of our unsold timber lands and would certainly decrease the resources of the provincial governments owning same.

Further sales of government timber lands could not be made to advantage and it would inflict a heavy blow on all spruce limits now under license, except those owned by pulp and paper mills. Thousands of square miles of timber lands would lie unworked for years with consequent loss in settlement and population.

The question of retaliation by the United States government I do not discuss, but it is a factor in the case although I feel strongly that we must draw the line somewhere as regards concessions. A policy of reciprocity, if obtainable, would be preferable to inaugurating a tariff war.

Pulpwood has been the means of saving waste in the woods where made in connection with logging operations.

A certain portion, and by no means a small one, of our northern spruce producing country cannot be developed to advantage by the building of pulp and paper mills, but the pulpwood on same can be shipped to very great advantage.

Every settler is more or less interested in the pulpwood trade and it has helped largely the clearing and settling of land.

The greatness of our water powers will be a telling factor in the future in solving this question of export duty.

SHIPMENTS TO OTHER COUNTRIES.

The shipment of pulpwood to other countries than the United States is to-day barred by transportation charges, as Europe is supplied to a great extent by Scandinavia on account of its proximity.

LAWS OF THE PROVINCES.

The province of British Columbia has now no law in force regarding timber cut as pulpwood, as they repealed the law in 1901 which charged a rental of not more than two per cent per acre and royalty of not over twenty-five cents per cord.

In New Brunswick, if pulpwood is cut on Crown Lands, it is subject to the dues of merchantable lumber, which for spruce are \$1.25 per thousand superficial feet and no log to be cut that will not make a log 18 feet long \times 10 inches at the small end.

The province of Nova Scotia issues twenty-year leases of timber lands for pulpwood purposes at \$1 per acre, authorizing the lessee to cut timber of not less than five inches in diameter. They, however, issue special leases in case of erection of pulp mills, etc.

The province of Quebec charges a stumpage of 65 cents on pulpwood per cord of 128 cubic feet, equal to 600 feet B.M., with a reduction of 25 cents per cord on timber manufactured into pulp or paper in the Dominion of Canada and in connection with this rebate the United States government imposed a countervailing duty of 25 cents a ton of 2,240 lbs. on all pulp made from wood cut on Crown Lands in the province of Quebec. Pulp made in Ontario from wood cut on Crown Lands in the province of Quebec was also subject to this countervailing duty. This stumpage of 65 cents per cord is equal to 91 cents per 1,000 feet.

The government of the province of Ontario cover the cutting of pulpwood to a great extent by arrangement between the province and parties acquiring areas, each individual case being dealt with according to circumstances, but generally the dues, as fixed on the 20th March, 1900, are forty cents a cord. A law was passed on January 13, 1900, prohibiting the export of pulpwood from the province of Ontario in an unmanufactured state. The lease for 21 years with the Rainy Lake Pulp & Paper Co. calls for 40 cents a cord for spruce, nothing to be cut under six inches.

INCREASE IN PULPWOOD TRADE.

The demand for pulpwood must increase rapidly in the future as it has in the past few years, as the number of articles made from pulp is daily increasing and the spread of education means more pulpwood in consequence of the dependence of the paper makers on the article. It is well to remember that what is disastrous to many trades is generally beneficial to pulpwood, viz.: War, as past experience has shown the very great demand for paper that it produces.

The uses of paper are also becoming manifold and so the circle is constantly enlarging. He would be a rash man who would undertake to limit the uses paper may be put to in the not distant future.

FOREST FIRES.

This has been dealt with by Dr. Robert Bell, but I think that the penalties should be more severe where fires in the woods are started by settlers.

SUGGESTIONS *re* FUTURE POLICY.

Although the pulpwood industry is regarded as inimical to forest culture, it must inevitably increase year by year and it is with this trade that the owners of timber lands, whether government or individuals, have to deal, as the denudation of the country will be affected by this trade in a greater ratio than by logging. It is well to bear in mind how much owners of private lands are interested in this question and that we have not to deal with governments alone.

The inroads pulpwood will make on our timber reserves will increase in an unknown ratio and, if conducted in a judicious way, will tend to the perpetuating of the trade in the same way the judicious logging of spruce has done. Of course, much of the country which is pulpwood-producing is not a desirable logging territory and consequently, the government of the province of Quebec permit cutting of black spruce 7 inches at the stump.

The reproductive qualities of spruce will act forcibly as a saving clause against annihilation of our spruce forests, and this alone, in my opinion, makes the forest wealth of the province of Quebec greater than that of our sister province Ontario, and of a far more enduring character.

I believe the interest of this country is to discourage by legislation, or otherwise, the cutting of trees for pulpwood under 7 inches in diameter at the stump and the shipping of pulpwood under 5 inches in diameter.

Increasing value of stumpage has a tendency to make people more conservative with their timber lands, as it pays to be so and the teachings of the forestry conventions and associations will be useless if they do not coincide with what the state and the individuals forming that state consider to be their interests.

Pulpwood affects all our interests directly or indirectly; it makes the article of paper which is used to spread the gospel this convention is preaching.

If this convention is the forerunner of a policy, as regards pulpwood, producing the best financial results with a minimum of destruction, it will have justified its being.

MR. J. F. ELLIS,

Representing the Toronto Board of Trade.

I have listened with a good deal of interest to the last paper read by Mr. Price on the pulpwood industry, and I must say that if the views he has laid before you as being the views of the Pulpwood Association of Quebec prevail, the expectation which I have often heard expressed that Canada will be the greatest pulp and paper producing country in the world will never be realized. The methods that are being pursued in connection with the woodpulp industry are such as to prevent the realization of our hopes in that respect. I have had a great deal of personal experience in the woodpulp and paper business, and I hope you will pardon me if I introduce personal matters. I have been in the paper industry for the past thirty years. When I began I sold many a ton of paper at \$200 a ton. From that time forward the price of paper gradually decreased. I never bought a carload of paper without being afraid that before I sold it I could buy the next car at a less figure, and I never thought of making a contract to buy paper for one year, as I knew full well that before the year passed the price would be lower. That went on for 25 years. Paper dropped from \$200 a ton to \$40. It gradually declined year after year. If there are any gentlemen in the paper business here they will understand me when I say that stopped five years ago. The price of paper was lower then than it is to-day. The manufacturer of pulp tells us that he has to go farther back to get his spruce. The spruce limits are being completely swept over. Everything is being cleared off. There is in the Annual Report of the Canadian Forestry Association an illustration that gives you a very good idea of what is going on all over Canada in connection with the woodpulp industry. Certain restrictions should be made. No owner of a spruce limit should be allowed to cut spruce under a certain number of inches in diameter, so as to leave sufficient trees for reforestation. If he cuts off to a certain size and leaves the rest before the owner of the limit completes the first cutting, he will have at the beginning another crop and so he can go on from year to year. This is a commercial question that we are all interested in. You buy your daily paper and you pay a cent for it. If news print goes up in price the publisher of the daily newspaper must either charge more for his paper or he must charge the advertiser more for his advertising. He has to get it back some way. We all want a daily paper, we know it is a great boon to us and we want to be able to buy half a dozen papers a day to inform ourselves on public questions. I think this association should pass a strong resolution to impress upon the public and the government the importance of taking stringent action to have the laws in connection with the spruce pulp industry so that the wanton destruction which is now going on may be stopped.



CUTTING WHITE PINE IN QUEBEC.

I had occasion four years ago, in company with a prominent paper maker of Canada, to visit the paper and pulp mills in the state of Wisconsin, where I believe more paper is made than in the whole of Canada, not excepting news print. We found around a great many of the mills immense quantities of spruce timber, and on inquiry learned that the whole of this came from the north shore of Lake Superior, it being sent to Appleton in rafts or by sailing vessels. They preferred it to come in rafts, as the action of the water loosened the bark, so that it was very easily taken off. We explained to them that we thought it would be better to have this wood made into pulp and paper in Canada, and would recommend to the Ontario government, a heavy export duty on all such raw material. This created quite an excitement among the consumers, as the forests of Wisconsin were practically denuded of spruce wood. Twenty-five years ago that state was in about the same position in this regard that Canada is to-day, and we are pursuing about the same course that they have done, and in my opinion the outcome is not far distant, when we will be in the same position that they are now. At present the paper industry in that state has built up and is maintaining such places as Appleton, De Pere, Menasha, and several other thriving towns, which are dependent almost entirely on the paper industry and kindred manufactures for their prosperous condition. Why should we contribute to the building up of this industry in a foreign country? Would it not be far better for us to conserve and build up our own industries by manufacturing the raw material into commercial shape.

FERD. VAN BRUYSEL.

After the stirring address by Honourable W. C. Edwards, the business-like and precise statement by Mr. H. M. Price, the alarmist appeal by Mr. Little, and the enlightening utterances by others which I do not and shall not forget, there is necessarily a reaction of feeling; your interest is waning, and the hour is late.

Discussion being opened upon the papers read, I beg to precede my few remarks by a personal appeal to your sympathetic attention.

I have resided here for a number of years in the interests of my own country, which is Belgium; when such mission ended, very much to my regret, I chose to return, and to establish my residence in Canada, because I love the broad lines of your country, the broad minds of its people, its bright and bracing climate, its grand forests.

In defence of these forests, I have lifted a feeble pen; but sentimentality has not blinded me to their business possibilities.

Consequently, I went to my native land and there secured capital, not, as many deplore, for exploiting your forests and exporting their raw products across the southern border; but to manufacture such products upon the spot, by converting them into pulp and paper in a large mill erected at Shawinigan Falls, on the Saint Maurice. This, by the way, is a site which, to quote a favourite expression of our expressive American friends, is second to 'none in the world' for the exercise of such industry.

While organizing the lumbering branch of such enterprise, I plead guilty to having persuaded the Department of Crown Lands in Quebec to alter the then existing regulations relating to the minimum size determined for the cutting of spruce trees, namely, eleven inches in diameter for all varieties. The limit was reduced to seven inches in the case of black spruce, because the latter generally grows in dense stands, and remains small, whereas the thinning out of such stands may favour the

growth of the remaining trees. As a matter of fact, black spruce seldom seems to naturally attain a large size, and any specimens measuring eleven inches which I have ever found, were nearly isolated. Had the former regulations prevailed, and were they in force, wide tracts of country, covered with dense masses of black spruce, would be without value commercially.

So much in response to indiscriminate and sweeping criticisms in regard to the cutting of small timber. However, owing to the difficulty of readily distinguishing varieties after barking, rossing, or driving in rough waters, a careful supervision at the stump is necessary, under present conditions, to avoid abuses through the destroying of undersized white spruce and balsam fir.

From the past proceedings of this convention, the foreign experts who have gratified us with their presence may suppose that progress in forestry is more marked in Ontario than in Quebec. One of these gentlemen has indeed given expression to such conclusion. But as an impartial observer, having lived in both provinces, I fail to see any material difference. The system of fire protection, for instance, so clearly described for Ontario, by Mr. Aubrey White, likewise exists in Quebec, where the tendency is to cancel the fire-tax for government protection, providing the limit-holders, most interested in preserving their own timber, and best knowing their own property, with its vulnerable or exposed portions, will also use men of their own, in proper season, for the prevention of fires, or fighting them. Under such circumstances, it remains for the government to see, by maintaining patrols, and otherwise, that the parties concerned are not neglectful of their undertaking to guard themselves, and the general public, against forest conflagrations.

Again, in the matter of reserves, if Ontario has its Algonquin Park, Quebec has its Laurentides Park. The policy of enlarging the area of reserves exists in both provinces, but Ontario has already adopted the better system of creating them by an enactment, whereas in Quebec they only exist by virtue of an order in council. I have reason to believe that the Honourable A. Turgeon intends to take any complementary measures necessary for protecting the head waters and banks of rivers in Crown lands, these measures being in such form that they may not hereafter be repealed by a mere stroke of the pen.

Another step in the right direction is announced by the Honourable Jean Prévost, who inclines to direct Quebec colonization as much as possible towards well chosen areas, where all available resources can be concentrated in the form of roads, bridges and other undertakings for the settlers, they no longer being allowed to scatter broadcast over the province. Should political pressure interfere with the execution of such programme, the assistance of an independent committee, appointed as magistrates are, and acting in the same spirit, may be useful for discriminating between lands suitable and lands unsuitable for agriculture.

But enough has been said to show that, as Sir Wilfrid Laurier himself and all Dominion officials have carefully pointed out, the provincial electorate, represented by the provincial ministers of Crown lands, holds over much the greater proportion of Canadian forests an undisputed sway. Thereupon hinges a proposal which I beg to refer for kind consideration to the Committee on Resolutions, namely:—

That from this highly interested and receptive body, an active committee be selected to report upon each main feature of the forestry problem;

That adequate representation be given upon this committee to the provincial authorities in whom is vested the utilization and preservation of the national domain;

That the reports obtained, embodying resolutions which will then be the result of practical compromise, be submitted in print to the public, or preferably to another gathering like the present, or, if this be impossible, to the Canadian Forestry Association.

BANQUET.

THURSDAY EVENING, 11th January.

A banquet was held at the Russell House, which was attended by over two hundred guests. Sir Wilfrid Laurier presided, having on his right His Excellency the Governor General, and on his left Col. J. G. Foster, United States Consul. Japan was represented by Hon. T. Nosse, Consul General.

The company, at the Chairman's invitation, drank His Excellency's health. Earl Grey responded in the shortest speech on record. In one sentence he said the convention had been a great success, and he hoped it would result in all that Sir Wilfrid expected of it.

'The Forest Interests of Canada' received hearty recognition, and replies were made by Hon. W. C. Edwards and Hon. F. J. Sweeney.

'The Allied Interests' brought to their feet Messrs. B. E. Walker and J. D. Allen, of Toronto. Mr. Walker said there was very little use in complaining about the fact that people in order to earn a living had sacrificed the natural resources of Canada in the past. The question was, what of the future? His opinion was that there was always sufficient intelligence and public spirit in Canada to cope with problems as they arose. Look, for example, at what had been done to develop our dairy interests, although the original efforts of the Government in that direction excited some ridicule and derision. Our people were equally alive to the importance of the cereal interests, and the question of transportation was on everybody's lips. The great fishery and forest interests of Canada should receive the same consideration and treatment as had the dairy and cereal industries. Mr. Walker closed with a prediction that richly endowed as Canada was with fisheries, timber, coal and water powers, she was destined to be the great industrial storehouse of the world.

Mr. Allen, in an eloquent speech, said the lumber industry had been one of the great animating forces which had placed Canada in the foreground. He eulogized Sir Wilfrid for initiating the convention, and said he had done a great work which would be far-reaching in good results.

The toast of 'Our Guests' was proposed in graceful terms by Sir Wilfrid, who said that Mr. Pinchot, Dr. Fernow and Dr. Schenck could not realize the pleasure their presence gave. Anything which would improve the happy relations between their country and Canada would always be welcome, 'We do not believe,' said Sir Wilfrid, 'that patriotism is founded on hatred. We love our own country—we love it best of all—but we love other countries also. The first place in our hearts is undoubtedly for Canada. The next place is for Great Britain, our motherland—(applause)—but I

know that I speak the feeling of every Canadian heart when I say that in the same heart is deep affection for the American republic. (Loud applause.) Our relations at this moment, I am sure, are happy and cordial. True it is that sometimes we have some little bickerings, but that happens among the best of families. (Applause and laughter.) It does not alter our friendship. Whenever we have little differences with our neighbours we take a leaf out of their book. We do the best we can for our own country, and I need not tell you they do the best they can for their own. (Laughter and applause.) Whether we win or whether we lose, our good relations will not be affected. It is the part of good neighbours that we should give and take in these matters, and, for my part, I have not the slightest doubt that the relations will always improve not only between Canada and the United States, but between Canada, the United States and Great Britain. The race has been separated by events to which I need not allude, but I do not despair that in the course of time a reunion may take place, which would place these three nations at the head of human civilization.' (Cheers.)

Mr. Pinchot, in the course of a happy response, said that, although the United States and Great Britain had been separated for a time, yet the day was coming when inevitably as the rising of the sun the parts which had drifted a little away from each other would bridge the gap, and once more make a solid whole, which would stand for righteousness, the civilization and the peace of the world. (Cheers.) 'To you, Sir Wilfrid,' continued the speaker, 'whose great work it has been to bring the English and French together, so that the strain can be united in one individual, I want to bring our respect and consideration, and to say that your name is known on the other side as a real friend of the United States.' (Applause.)

Witty responses were also made by Dr. Fernow, of Cornell University, and Dr. Schenck, of Biltmore, N.C.

Mr. J. F. MacKay, business manager of *The Globe*, replied to the toast of 'The Press.' He said the Press Association, which he represented, were proud of the fact that they were allied with the Forestry Association.

MORNING SESSION.

FRIDAY, 12th January.

THE TIMBER SUPPLY OF THE RAILWAYS.

JOSEPH HOBSON, CHIEF ENGINEER, GRAND TRUNK RAILWAY.

I have been instructed by Mr. Hays, the second vice-president and general manager of the Grand Trunk Railway Company, to prepare a short paper dealing specially with railway ties, and, generally, with other timber requirements on the Grand Trunk Railway system, to be read at the Forestry Convention which is to meet, in Ottawa, early in January next, at which, under the fourth division of the notice calling the meeting, will be discussed the question of 'The Relation of our Forests to Railways, &c.'

Railway companies being among the largest consumers of timber, are greatly interested in ascertaining whether, with conservative treatment, the accessible sources of supply are practically unlimited, if drawn upon or worked under well-considered and rigidly enforced regulations; or are likely to be exhausted within a comparatively short time.

Of the timber resources of the Dominion, as a whole, I am not qualified to speak with confidence, as I am practically unacquainted with the territory lying north of Lakes Huron and Superior, and also with the undeveloped districts in Quebec and the western territories; but so far as a large part of the Dominion is concerned, I should not suppose that, for a long time yet, there is any serious danger of a tie famine, as new lines are opening up large areas which will furnish tie material, although probably at considerably higher prices, (by reason of local haul, &c.), than are now being paid for it. I, however, repeat that I speak with some hesitation on this point, on account of defective information in regard to the matter of timber reserves throughout the Dominion.

Further, antiseptic treatment of timber will ultimately have to be adopted on a large scale, to minimize consumption by giving longer life to the ties, and by making it possible to bring into service several kinds of timber, which, in their natural state, are not looked upon very favourably by railway officers: among these are maple, beech, birch, hemlock, tamarack, black ash, red oak and some of the inferior kinds of pine. These woods are, however, all sufficiently porous, when properly seasoned or otherwise treated for the removal of the natural sap, to be easily penetrated or saturated by antiseptic preparations. Of course, all timber ought to be properly seasoned or desiccated before being chemically treated.

I have intentionally omitted cedar from the above list, because this wood scarcely requires antiseptic treatment for the prevention of decay; although possibly it might be worth while to creosote it, for the purpose of giving it greater hardness and capacity to resist cutting or abrasion under the rail.

On the Great Western Railway of Canada, with a main track mileage of 1,458 miles, and a side track mileage of 307½ miles (now incorporated with the Grand Trunk Railway system), we began using untreated cedar ties in 1878, with eminently satisfactory results. Prior to that time we had used, for our main tracks, white oak, red oak, hemlock, tamarack and occasionally chestnut and black ash. The number of chestnut ties was, however, small as the timber was, rather scarce; it was also soft and liable to split unless cut out of large trees. As to red oak and black ash, they, to a considerable extent, had gone out of service, as their life was short and their behaviour in a derailment decidedly unsatisfactory—in fact, they had scarcely a redeeming feature.

Cedar ties were occasionally used to a small extent in sidings, but scarcely at all in the main tracks, as, among many railway officers, there was a strong objection to them, and a very decided aversion to them existed among the more conservative inspectors and roadmasters, simply because the latter had never used cedar ties, and had, therefore, no practical knowledge of them.

So far as comparative immunity from decay is concerned, cedar is the best Canadian timber that I have any knowledge of. Almost the only objection to it is, that it may perhaps not be quite hard enough to meet all the requirements of an ideal railway tie; but experience has clearly demonstrated that it is quite strong enough for all demands made upon it in the way of carrying trains safely and maintaining the rails in gauge.

Under a heavy traffic and the largest class of rolling stock, the rail will, of course, gradually cut into the tie; and when a train leaves the rails, many of the ties will probably be broken.

In the eighteen (18) years between 1878 and 1896, cedar gave the most satisfactory results, and materially reduced the cost of track maintenance.

As to the objection that the rails may cut into cedar ties; I consider it carries very little weight, as this defect can be remedied by the use of tie plates; and ex-

perience has shown that, in the course of time, the cedar is less cut into by the rails, even without tie plates, owing to its greater immunity from decay, than white oak, the life of which is not nearly so long as that of cedar, and into which the rails cut after a few years service.

Cedar ties with tie plates make a very strong track, the cost of which would be less than treated white oak; and on curves it could be used with quite as much safety, because the tendency of the train to spread the track or widen the gauge, by forcing out the outer rail would be resisted by both the inside and outside spikes securing it to the ties. As a matter of professional interest I have read a great deal bearing upon this question, in railway and engineering papers and reports. I have also closely watched, as opportunity permitted, the action of the rails upon ties unprovided with plates, and the conclusion I came to long ago was, that the cutting of the tie under the rail was really a wearing away or erosion of the fibre—not a simple compression of it, due to the softness of the wood.

The mechanical disintegration of the fibre is occasioned by the practically almost imperceptible horizontal movements of the rails owing to their undulations under passing trains. This grinding or rasping action is, of course, intensified by sand getting in between the tie and the base of the rail when the latter rises immediately in front and in rear of passing loads. This is the opinion, I believe, generally held as to the cause of the cutting of the tie, by those who have carefully studied the matter and have written upon it.

In my opinion, the greatest objection to cedar ties is that they are likely to be broken in the event of a derailment. Acting, however, on the principle of choosing the lesser of two evils, I consider that a practically imperishable wood, so far as decay is concerned, is better than a material that develops more or less weakness, which may lead to accidents, after but very few years of service.

On the old Great Western Railway, now part of the Grand Trunk system, cedar ties were used on tangents to a very large extent, the white oak ties being used chiefly on curves and in switch loads.

As I have already stated, the employment of cedar largely reduced track maintenance charges, the annual tie consumption having been reduced to about one-half of what it was before they were brought into use; and in no instance during the many years they have been in service has there been, to my knowledge, a derailment directly chargeable to them. Their average life was nearly fifteen (15) years, which was unquestionably a good record for untreated material.

As cedar ties do not fail from decay, but, principally, in consequence of the rails cutting into them, our branch lines were, ultimately, almost entirely equipped with cedar, white oak ties being used only on the more important switch leads. On these portions also of the division, such as the main line and on the Toronto and Sarnia districts, over which the heavy and fast passenger trains were run, the tangents or straight portions of the track were largely laid with cedar ties, the white oak being used chiefly on the curves.

For a long time the Great Western Division stood almost alone in the use of cedar ties for main tracks; but large quantities of these ties are now in use on many important American railways.

Practically none of the cedar ties now used on the Grand Trunk Railway system are obtained in the territory through which the line actually passes. About 50 per cent of the total quantity used is delivered at Chaudiere Junction, about eight miles from Quebec; about 40 per cent at Wiarton, on the Georgian Bay; and the remaining 10 per cent is picked up at various points on the system.

Cedar ties for the Grand Trunk lines west of the Detroit and St. Clair rivers, are delivered at Bay City.

For the current year, 1905, out of 1,200,000 cedar ties bought, only about 150,000 were obtained outside of Canada.

Oak ties used in Canada, are nearly all obtained in Kentucky, Tennessee and Arkansas.

Owing to the diminishing sources of supplies of tie material, there is an increasing necessity for its preservative treatment. This is certainly recognized in the United States, where in 1894 only 950,000 ties had been antiseptically treated, while ten years later (1904) the number had increased to 13,775,000. I think I am correct, but I cannot speak with absolute certainty, when I say that the process most generally in use, owing to its low cost, is the zinc-chloride or Burnettizing; but so far as good results go, this is certainly not the best, as zinc-chloride, being soluble in water, absorbs moisture and therefore leaches out more or less, according to the conditions to which it is exposed. Outside of interest on value of plant, taxes and maintenance, it is said to cost only about eleven cents (11 cents) per tie; but owing to want of uniformity in the conditions under which the work is done, the cost varies considerably. Some who have used zinc-chloride put it as high as twenty cents.

The cost of creosoting ties on English railways is from about twenty-five to thirty (25 to 30) cents, and the life of the tie is thereby increased to about sixteen (16) years. On the most important French railways, sixty pounds (60 pounds) of creosote are injected into a tie—the size of which I am unable to give—the result, it is said, being that a life of from twenty-five to thirty (25 to 30) years is obtained. Beech ties treated in this way are claimed to last twenty-seven (27) years under the heaviest European traffic. In Germany, a life of from fifteen to eighteen (15 to 18) is secured for beech and pine ties. On the European railways, where expensive creosoting work is carried on, the rails are generally secured to the ties by lag screws, instead of by spikes, whereby a minimum of injury is done to the ties.

Crude creosote is generally admitted to be the very best material in use at present for the impregnation of ties, as it is rich in carbolic acid, naphthaline, &c.

In considering the life of creosoted ties, it is important to determine whether the tie is worn by the abrasion of the rails, or has to be renewed in consequence of decay. A sound tie may be worn out by the mechanical action of the rail, but this, of course, can be obviated by the use of tie plates.

Having had no practical experience in the antiseptic treatment of timber, I cannot speak from my own knowledge as the cost of the process. One eminent American authority puts the cost of the zinc-creosote process, in America, at twenty-two (22) cents per tie, and states that ties treated in his way have had a life of from fifteen to eighteen (15 to 18) years in Germany, where they have been thoroughly tested. He adds that ties of the same class were treated in England with thirty pounds (30 pounds) of creosote at a cost of forty (40) cents; and that in America the cost of eighteen pounds (18 pounds) of creosote per tie is thirty (30) cents.

The quantities of timber of various kinds required for the maintenance of a railway are necessarily large. On the Grand Trunk system, for instance, during the seven years between 1898 and 1894—both years included—the average annual number of ties used was 2,102,653, or say 63,000,000 feet B.M. In addition to this, was the material used for bridges, station buildings, cars, &c., &c. I can only give the amount of this for the year 1904, during which, I understand, there was nothing abnormal in character or extent of the works in progress.

The figures are as follows:—

	Feet B.M.
Oak	2,161,000
Pitch pine	8,819,000
Fir	105,000
White pine	9,234,000
Red pine	2,737,000
Spruce	1,407,000
Hemlock	3,494,000
Cedar	2,889,000
	<hr/>
	30,846,000

The gross total of the annual consumption of timber on the Grand Trunk system may therefore be called, in round figures, ninety-five million (95,000,000) feet B.M.

The very large consumption of timber for railway ties, fence posts, telegraph poles, bridge construction, cars, &c., has long been a subject for the serious consideration of railway companies.

The importance of the antiseptic treatment of ties is emphasized by the statements in the two immediately preceding paragraphs, from which it appears that practically two-thirds of the timber consumption on an important railway, such as the Grand Trunk, are for ties.

With regard to the cost of ties: I find in looking over the records of the old Great Western Railway, which, as already stated, is now part of the Grand Trunk system, that the cost of white oak ties was, in 1895, practically the same as it is now; while that of first-class cedar was from three to seven cents less.

Steel and masonry of various descriptions—including concrete on a large scale—are now taking the place of timber in the construction of bridges and buildings of all kinds; and steel ties have already been used to such an extent as to demonstrate that, under certain conditions, they can be substituted for wood with a fair degree of success. It will, however, probably be conceded that, at the present time, the best means of guarding against a tie famine will be found in the thorough antiseptic treatment of wooden ties. There are, apparently, also fairly good reasons for believing that steel ties, under certain conditions, can be used with advantage.

THE RAILROAD AND THE FOREST.

MR. L. O. ARMSTRONG.

Canadian Pacific Railway Colonization Agent.

The reading of papers is very disconcerting to me. As colonization agent I am much more accustomed to the stump. This diffidence is increased by the fact that during the last two days I have heard so many denunciations of the railways in public and in private that I have almost come to believe, that personally I must be a 'chief among sinners,' and I have at times longed for a penitent bench or a confessional that I might get rid of the burden of my sins against the forest. I will confess them openly and thus get relief. Appearances are against me. I acknowledge that I am a descendant of Johnny Armstrong, by some called marauder and cattle thief, and 'blood will tell.'

For over thirty years I have been colonizing the forest lands of Quebec, Ontario and British Columbia, as well as the prairie. I am thus self-convicted; but I am afraid that Father Burke will not give me absolution, because I am not sincerely repentant—I offer pleas in extenuation.

1. I sinned through heredity. My forefathers were Loyalists; they were invited to leave their comfortable homes in New York in 1783 by a certain general called George Washington backed by 3,000,000 settlers (look out for the settlers) and their French allies. It was an unreasonable action on their part, but my people evidently found it advisable to submit. These ancestors of mine (always on the losing side) exchanged the roast beef, pork pies and ale of the good old colonial days of New England for a very uncertain supply of grain raised in the woods sixty miles northeast of Montreal, which grain was pounded in a hole hollowed out of a log with a big hardwood pestle. For feast days a supply of it was carried on man-back thirty miles to the mill and back again. I have long since learned to be thankful to General Washington for his action; had it been otherwise I might have been one of those unhappy plutocrats who have to walk with bare feet in the grass to get an appetite for breakfast. It is conceivable that these ancestors of mine loved big clearings and that every

tree was an enemy; and that I inherited some of this feeling, therefore, I sinned by heredity.

2. I sinned from necessity, because of an excess of boyish patriotism that led me to colonize over thirty years ago first as an amateur, and necessity has kept me at it ever since for the Canadian Pacific Railway.

As I look back upon it all I confess to a measure of sincere regret at the thought of the quantities of fine timber that I have, even if very indirectly and unavoidably been the cause of destroying. I say unavoidably, because when I began this work it was most undeniably the duty of every Canadian to try to stem the exodus of his countrymen to the United States. There was little knowledge abroad about the North-west, and that knowledge was to the effect that the soil stayed frozen there all the year around. There was no Forestry Association in those days, and consequently no enlightened public opinion. The North-west opened up, however, and I went there in the early days. It was a long round about journey through the United States across much treeless plain to our own treeless plains. More than once I have ridden thirty miles and more before I could get a drop of water to drink. The forest 'reason why' came to me there and then and I became a lover of the forest; it was a sudden but lasting conversion.

I admit the wastefulness of some settlers; of many settlers perhaps, but not of all; and I ask the lumbermen to admit that there have been hemi-demi-semi occasionally found some lumbermen who sometimes broke the ten commandments. We have a hot controversy going on between the lumbermen and the settler. I know a good deal about it and I think I can be impartial in my judgment about it, because, if as colonization agent my sympathies might be strong for the settler, as fish and game man for the Canadian Pacific Railway, I am naturally a strong protector of forest and stream and I know the lumbermen to be one of the most valuable patrons of the railway and generally a very good fellow.

Let us then look impartially at that northern country, bearing in mind the needs of both lumbermen and settlers.

Between the Red river of the north and Labrador, I should judge that 50 per cent of the forest land is good for agriculture. Forty per cent of the remainder is growing timber. The remaining ten per cent is bare rock and water. Of the 50 per cent of good land a portion is growing such good timber that it should not be thrown open for settlement. There will still be good land enough left for colonization. The lumberman is apt to classify all settlers that colonize near his limits as timber wolves. The settlers give the 'retort courteous,' calling him a bigger wolf. My experience is that the human nature of both is of quite the average Canadian brand; and that is a brand that upon the whole is very wholesome. I think the fault is now, and almost always has been, with our laws. No government ever seems to find time or to take the trouble to inspect the land and to put the settler where he should be and keep him there. The railroad is very much interested in this question because it needs both the lumberman and the settler for profitable traffic, and as 94 per cent of the revenue of the railway is spent in the country, the railway's need is the country's need. The settler we will always have with us, let us by the courageous enforcement of just laws make him a loyal and contented settler.

About 1875 I remember putting a large number of settlers on forest land where the soil was good, but where every farm had low lying land growing small cedar and tamarac, with a few trees fit for ties. I urged upon the settlers that they should make the large trees into ties and wait a few years when there would be, helped by the thinning out, another and better crop, and that by leaving seed trees the crop would be an annual one. I told them that they ought to burn the tree tops and dead timber; but all in vain, and many times has this experience been repeated. They cut everything, slashed and burnt, and now some of them have to go miles for firewood, and a considerable part of their too big slashings and burnings are growing up in birch and poplar brush, which will have to be cleared again. These men are growing old now. They do not want to leave home for distant winter work in shanties, and they are

compelled to stay at home where their horses and they themselves are eating their heads off for want of winter work. The evil does not end there, because their wasteful lumbering and careless burning has destroyed the timber on miles and miles of the government land surrounding them. The governments have been remiss. They should have educated those people, and as there is still fortunately much forest to save, they should begin that education now. It should be a plain education. It should be given *viva voce* by qualified men in the back woods school-house by the teachers in that school-house; it should be published in country papers, and not only in blue books and regulations that are not read by those who chiefly need the knowledge which they are intended to spread.

Another asset which the people should be taught to save is that of the fish and game, but that is a story for *Rod and Gun*.

A few years ago I conceived the idea that a map of Canada would be interesting, which would show our forest area and the habitat of the fauna, the big and small game and fish of the country. '3,000 miles of Forest Stretching from Ocean to Ocean' was one of the legends on this map. The map not only proved a useful advertisement in making known the attractions of the country for sportsmen, but it also brought a surprising number of inquiries for timber from all over the United States, and quite a few from other countries. From those inquiries I learned two things. First, that they came from portions of the United States that I had thought phenomenally rich in timber, and especially in tie and pulpwood timber. Secondly, I learned that I had given a wrong impression, viz: That the map led many to believe that Canada had about 3,000 miles long of solid and heavily timbered lands, which is, of course, a wrong impression. There are gaps of water, rock and meadow, muskeg and bigger and ever bigger gaps made by fire. I merely wanted to show sportsmen by means of that map that we had forest enough to protect the game. We have that much forest, and it is a forest that will furnish cover to game, that will conserve our water supply, that is very valuable and that can be made much more so, but it is not all an area of everywhere equally visible timber. This was brought home to me vividly when our general tie agent asked me how much of the forest mentioned on the map was good for ties. It took an effort, quite a search, indeed, through map and memory, to locate good tie tracts, and the result of the search was to convince us that it would soon be necessary to grow ties; and the thought came to me that the government might work in unison with the railways in this work.

It will not pay to plant trees on good land, but it may pay to protect and cultivate the second growth on rough land unfit for cultivation near the various railways. Some little seeding of trees might also be done under favourable conditions. Even under the most favourable conditions the railway companies would prefer to leave it to the state or to private enterprise rather than undertake it themselves, but the difficulty is that it should and must be done now. It is the question of the day, and one that will not down.

I feel that the protection of the forests, and in many localities re-forestation, is imperatively necessary and at once.

I will give you a resume of the quantity of timber used annually by the Canadian Pacific Railway alone, which will, I think, convince the reading and thinking public of the fact that the time has come when the various governments should have qualified officers, first-class reliable men, as forest protectors and silviculturists. Their positions should be permanent, and independent of party politics with their exigencies.

The need of this is exemplified and brought home to us in a hundred ways. This annual consumption, for instance, which is for maintenance alone (not for construction of new lines), by the Canadian Pacific Railway company, which will soon be only one among several transcontinental lines, is an argument to the point which he who runs may read.

Let me give you a few figures which are in some respects sadly eloquent. First, I should speak of the quantity required for western lines, *i.e.*, from Fort William, at the western end of Lake Superior, to the Pacific coast, viz. :—

Ties:—3,500,000, of which 50 per cent are obtained east of Winnipeg. 28 per cent on the Crow's Nest Branch, and 22 per cent at Golden B.C., and west thereof, including the Kootenay district. From Winnipeg to Fort William the ties average 75 per cent jack-pine and 25 per cent tamarac; on the Crow's Nest branch we use 10 per cent jack-pine, 57 per cent tamarac and 33 per cent fir, and at Golden and west, including the Kootenay district, the percentages are as follows: Jack-pine, 2 per cent; cedar, 4 per cent; tamarac, 14 per cent, and fir 80 per cent.

The annual requirements of track ties for Canadian Pacific Railway lines east of Fort William are about one and one-half million ties. Deliveries made in 1905, averaged 52 per cent cedar, 28 per cent hemlock, 7 per cent tamarac and 13 per cent jack-pine.

The supply for lines east of Megantic was cut entirely in New Brunswick and the majority of these ties had to be driven upwards of fifty miles before starting on their long rail haul. This timber was 95 per cent cedar, the balance being hemlock.

For the eastern division from Megantic to Quebec, and west to Smith's Falls and Chalk River, the percentages of timber were cedar, 63 per cent; hemlock, 28 per cent; tamarac, 8 per cent; jack pine 1 per cent. The source of supply of these ties is from streams tributary to the St. Lawrence and Ottawa rivers and they have to be driven hundreds of miles.

For the Ontario division from Smith's Falls to Windsor and Owen Sound, the percentages were cedar, 55 per cent; hemlock, 43 per cent; tamarac, 2 per cent; obtained mainly from the Manitoulin island and Georgian Bay points, and they are freighted by boat across the upper lakes. For the Lake Superior division from Chalk River to the Soo and Port Arthur, the percentages were cedar, 4 per cent; hemlock, 20 per cent; tamarac, 18 per cent; jack-pine, 58 per cent. These ties also have to be procured from territory miles back from the Canadian Pacific Railway line and are driven down stream, the timber country adjacent to the railway being exhausted for ties.

Summary of Canadian Pacific Railway requirements for the whole system:—

5,000,000 track ties, 140,000,000 feet, B.M.; Switch ties, 3,250,000 feet B.M.; Piling and cribbing, 420,000 lin. feet; 30,000 telegraph poles (cedar); 250,000 fence posts (cedar).

Of switch ties, 75 per cent used east of Fort William were of white oak procured from the United States, the balance was tamarac and hemlock. West of Fort William the timber used was tamarac and fir.

Besides this material, which is handled by the general tie agent, we use 25,000,000 of British Columbia fir alone, and altogether about 75,000,000 feet B.M., of red and white pine and spruce for the building of cars, tanks, stations, bridges, &c.

I may say that the jack-pine and tamarac of the height of land in the east is harder and much better than the jack-pine of the Rockies or that of more southern latitudes in the east. On the height of land jack-pine proved to be the best timber available after the tamarac supply was killed by an insect, consequently, it will be seen jack-pine is our chief tie timber between Winnipeg and Fort William, and from the enormous annual consumption it is gradually diminishing. In the mountains west of Golden and the coast the quantity of jack-pine supplied is very small.

While white cedar is used to a very small extent large quantities can be had in many parts of Canada, and the adoption of tie plates will no doubt make the use of this timber more universal, because it is that one of our timbers which withstands decay longest and it is only the soft nature of the wood which makes it unsuitable for ties, unless tie plates are used.

There are great quantities of spruce timber available, which, when it has been demonstrated that it can be creosoted economically should make good track ties. The treating of all ties will be necessary in the not far off future. Australian ties may put off the evil day. It is claimed for them that they have a life of twenty-eight to thirty years, but it has to be shown that they will last that length of time in our climate, where frost cracks some kinds of timber and renders it almost useless.

Tree planting can be done on the plains for ties, but it would be a very expensive crop to harvest. This may be joint work for the government and railways.

I would like to say a few words about forest destruction. East and west fire is the greatest enemy of the forest. We have at last begun to fight the enemy with some show of success. We have not, however, invoked the aid of the natural fire guardian to the extent that we should. We have not enlisted the services of the Indian.

Let us make him feel that we are not robbing him entirely of the forest. One of the worst fires that Ontario has ever seen was lighted by an Indian who wanted to keep the white man out of his hunting grounds. We can still enable him to live by the forest, and that for ever. Until spoiled by contact with the white man the Indian is an exceedingly careful man about fires—a ready made fire guardian. Here is our opportunity to do him justice for past injuries.

In conclusion, let us glance at our country from east to west. In New Brunswick there are areas that have been wastefully cut over and criminally well prepared for fire; the fire has come in some places repeatedly, making of what was once a more or less well forested area a desert of stone, gravel, sand, fire-weed and valueless bushes, which can be improved economically only by the government, be it federal, provincial or municipal. There are other areas of a more hopeful nature, where the fires have not been so disastrous; in those places ten to twenty-five years of care and cultivation might earn a small compensation for moneys invested. There are areas again where the results might pay 5 per cent on capital invested. I cannot see anything more than this for the investor in the venture. It must, however, be done; New Brunswick already has its barren lands; their area must not be increased.

What is true of New Brunswick is true of Nova Scotia, Quebec, Ontario and British Columbia.

Let us, as an association, take courage from the fact that everybody will soon be on our side. I was delighted last night to hear of the position to be taken by the press in promoting the education of the people in forestry.

We would ask all the newspapers of the land to make extracts from association reports showing the importance:—

1. Of leaving seed trees.
2. Of utilizing all the tree and burning the brush carefully to stop the breeding of insect pests and fire.
3. Of improving a forest by thinning it.
4. Of avoiding the clearing of steep-hill lands and stony lands, which should never be cleared.
5. Of knowing how a clearing fire should be made.
6. Of knowing how to plant the trees or seeds, and how long they will have to wait before they benefit thereby, which is not as long a time in Canada as many imagine.

We think the forest alongside of railways should receive the first attention because the most valuable object lessons that forestry has to teach will be learnt there by a greater number of people than elsewhere; because there railways during construction, and lumbermen, and settlers, and campers and lightning have caused fires and made the country too often a blackened waste in the sight of all men, and its reputation suffers unjustly while this unsightliness lasts.

I would be pleased, indeed, if this little paper were in the slightest measure responsible for immediate action in this direction. I thank you for your attention.

THE PULP AND PAPER INDUSTRY OF CANADA.

BY E. B. BIGGAR, EDITOR PULP AND PAPER MAGAZINE.

Three years ago Canada entered on the second century of its career as a pulp and paper manufacturing country. For the pioneer mill, as well as for the development of recent mills operating under the most modern conditions, this country is indebted to enterprising citizens of the United States. The industry had its birth in

1803 at St. Andrew's in the province of Quebec, a company of men from the United States, with James Brown at their head, having obtained a thirty year's lease from the seigneur of the district. In this same year the Fourdrinier machine which was to revolutionize paper making was introduced into England. The St. Andrew's mill, which was a small one, found its market in Montreal and Quebec, and was operated until 1834, when a freshet carried away the dam, and the seigneur objected to its reconstruction.

A newspaper proprietor, A. H. Holland of the *Halifax Recorder*, built the second mill near Bedford Basin, N.S., about 1819, and the first mill in upper Canada came into existence in the following year at Ancaster. The last named mill soon disappeared, but public attention was now directed to the subject, and as the result of a bonus offered in 1826 by the government of Upper Canada to the first paper mill that should be started two contestants ran a race in building. The contest was so close that the winner was only able to secure his prize by starting his mill on a Sunday. By 1842, Upper Canada had fourteen small paper mills. The census of 1851 showed that Upper and Lower Canada had five mills each, the returns of 1861 adding one mill to Lower Canada. The census of 1871 gave 12 mills to Ontario and 7 to Quebec, and one each to New Brunswick and Nova Scotia, these 21 mills employing 760 hands. The census of 1881 recorded 36 paper mills, and 5 pulp mills, and that of 1891, 34 paper mills and 24 pulp mills.

It was in the decade 1880-90 that the era of the pulp and paper manufacturing from wood may be said to have begun in Canada. In 1886 the writer took some samples of pulp and paper made by the Canada Paper Company to the Colonial and Indian Exhibition in London, and though the suggestion that Canada could supply pulp to British paper mills was not then regarded seriously, actual shipments began shortly afterwards in quantity, and when wood pulp first figured separately in the trade and navigation returns in 1890, the value of the shipments had reached \$168,180.

The development of pulp and paper manufacturing from 1888 to 1905 is shown by the following figures compiled from the various editions of the Canadian Textile and Paper Trades Directory:—

PULP MILLS.

	1888.		1892.		1899.		1905.	
	No. of Mills.	Capacity in tons per 24 hours.	No. of Mills.	Capacity in tons per 24 hours.	No. of Mills.	Capacity in tons per 24 hours.	No. of Mills.	Capacity in tons per 24 hours.
British Columbia			1	10	1	10		
New Brunswick..	2	7	2	17	4	143	6	198
Nova Scotia.....	2	7	3	14	5	91	6	141
Ontario.....	10	41	10	46	12	492	12	615
Quebec.....	20	99	21	225	17	409	32	1,516
	34	154	37	312	39	1,145	56	2,470

PAPER MILLS.

British Columbia			1	6	1	10		
Manitoba.....	1	5	1	5				
New Brunswick..	2	3	1	3				8
Nova Scotia.....					1	5	1	4
Ontario.....	19	83	17	96	15	109	18	251
Quebec.....	18	82	18	99	16	204	18	591
	40	173	38	209	33	328	38	854

SUMMARY—PULP MILLS.

Year.	No. of Mills.	Capacity in tons per 24 hours.	Remarks.
1888.....	34	154	} Or at 300 days to the year 741,000 tons per annum.
1892.....	37	312	
1899.....	39	1,145	
1905.....	56	2,470	

SUMMARY—PAPER MILLS.

1888.....	40	173	} At 330 days to the year 281,820 tons per annum, or nearly a million tons a year of pulp and paper
1892.....	38	209	
1899.....	33	328	
1905.....	38	854	

NOTE.—The total capacity of mills producing chemical pulp by the sulphite process was about 500 tons per day in 1899, and the same in 1905, so that the increase of the last six years has been wholly in mechanical or ground wood pulp.

It will therefore be seen that the capacity of the Canadian pulp mills has more than doubled, and the capacity of the paper mills increased still more in the last six years. Besides the mills in actual existence at the close of 1905, there are now in course of erection six pulp mills with a total daily capacity of about 630 tons, and eight paper mills with a total daily capacity of 375 tons. These do not include the names of the companies who have projected, but have not yet actually started mills.

These mills manufacture all grades of wood pulp, and most varieties of paper ranging from common wood board, straw board, and building papers, to fine book, writing, bond, ledger and coated papers. They not only supply the bulk of the home market in certain lines, but of recent years the paper mills as well as the pulp mills have developed an export trade. In the last fiscal year there were exported Canadian wall papers to the amount of 248,574 rolls valued at \$23,053, and other papers to the value of \$1,768,020, while pulp to the total value of \$3,399,153 was exported to the following countries: Great Britain, United States, France, Newfoundland, Belgium, Australia, British East Africa, Japan and Bermuda. Of these countries the United States took from us pulp to the value of \$2,694,122, Great Britain, \$680,199, and France, \$14,168. Within the last half of the last calendar year the shipments to France have notably increased, and this trade bids fair to add a strong commercial tie to the sentimental tie that links the province of Quebec to France.

In addition to being a large manufacturer of paper, Canada is a generous consumer of foreign papers. The imports of dutiable papers in the last fiscal year were \$2,950,752, and of paper and books free of duty \$824,750, making a total of \$3,842,898. It is worth while here to note the share of the mother country, and that of the United States in this trade. Of printed, unprinted, dutiable and free papers Canada took from Great Britain to the value of \$1,097,544, while from the United States her imports were \$4,241,098. In each of the 31 classes specified in the trade returns the United States led last year. When the four Canadian provinces began life as a confederation almost the reverse was the case, Great Britain in 1868 leading in all but two items, her total exports of paper and paper manufactures to Canada being \$897,279, against a total of \$385,282 by the United States. This remarkable change is explainable to a great extent by the part played by wood in the paper industry of the world, and the special relation of Canada to the pulp and paper industries of the whole American continent.

Canada has the greatest area in the world of forests suitable for the manufacture of pulp—her spruce lands alone being estimated at 450,000,000 acres—while the great net-work of floatable rivers, and the enormous water powers of the country have attracted the attention of the nations, especially the alert nation to the south. The vast output of books and other manufactures of paper, and the still vaster output of the newspaper press of the United States have made corresponding demands on the pulp and paper mills of that country which have increased in number from 776 in 1900 to over 1,200 in 1905, producing between 3,000,000 and 4,000,000 tons of paper in the year. The wholesale destruction of pulp timber has already brought some of the states face to face with a wood famine. Being no longer able to obtain cheap supplies of wood at home, many of these manufacturers have turned to Canada, with the result that timber limits ranging in area from 50 square miles up to 2,800 square miles, chiefly in Quebec, New Brunswick and Nova Scotia have been acquired as a means of supplying themselves with raw material, and the process of forest destruction which is reducing some of the states to sterility has now been transferred to a country whose people have scarcely yet begun to realize the desolating effects of unregulated pulpwood operations. Thus by means of the cheap supplies of superior Canadian pulp and pulpwood United States mills with their modern equipment have not merely displaced British papers, but compete with Canadian mills.

According to Canadian returns, the exports of pulpwood for the year ending June 30 last, were 593,624 cords, valued at \$2,600,814. These returns are considered by those who should know to be much understated. The methods of measuring in some districts give from 140 to 170 cubic feet instead of 128 to the cord. On the borders of Maine and New Brunswick and other regions where streams cross and recross the boundary, quantities go out without record as exports, while around the upper lakes quantities are taken from unfrequented streams, and towed across the lakes without record. Some shipped as cordwood is said to find its way ultimately to the pulp mill after arriving in the United States. For these and other reasons it is probable that the actual present export of pulpwood to the United States amounts to 750,000 cords annually—some place it at nearly a million. The shipments over the Quebec Central Railway alone last year to the States were 235,476 tons, or at 72 cubic feet to the ton, 132,455 cords; over the Intercolonial, 173,245 tons, or 97,550 cords; over the Great Northern, 10,148 cords; over the Quebec and Lake St. John, 18,000 cords. The figures for the two principal railway systems, the Canadian Pacific Railway and the Grand Trunk Railway, are not available, and there are the shipments by barge and tow up the St. Lawrence, and across the upper lakes to be dealt with.

But taking the official returns as correct, we find that the exports of pulpwood to the United States have increased from \$80,000 in 1890, to \$637,865 in 1896, and to \$2,600,814 in 1905, or more than four-fold in the past ten years. This rapidly increasing depletion of some of the best and most accessible pulpwood areas of Canada by manufacturers of the United States, presents a problem that can be looked at from two standpoints—that of its effect on the Canadian pulp and paper trades, and that of its effect on the agricultural and other national interests, such as timber supplies and water powers, which are dependent upon the distribution of rainfall.

Looking at pulp and paper manufacturing as a Canadian industry, it will be evident that a country having an estimated area of 450,000,000 acres of spruce lands, not to speak of poplar, balsam and other woods, and probably 40 per cent of the world's water power, is destined for a great career if it is not marred by improvident legislation. But the immediate difficulties are that it is placed side by side with the same industry in a country of larger population and larger markets, whose manufacturers have the command of greater skill and capital, and more experience in the export trade; that these manufacturers have unrestricted access to some of the best pulpwood areas in Canada for their raw material; that they have in pulpwood the lowest railway freight rate levied on any material, and in some instances this rate is made still more favourable to them than to Canadian mills drawing supplies from a like distance; that by reason of these advantages and that of getting the best raw material in the world from

Canada they are able through their protective tariff and large output to hold their home market and to ship their surplus to compete with the Canadian manufacturer. As one manufacturer puts it, the United States paper manufacturers maintain their export trade by means of Canadian pulpwood, for the raw material derived from Canada would produce all that the United States mills export to all countries, and leave a surplus for their home trade; while if they were deprived of this source the cost of their raw material would be increased by 25 to 35 per cent. It would then be more difficult for them to undersell British and Canadian manufacturers either abroad or at home. This change would give a great impetus to the Canadian pulp and paper trade, for if the 750,000 cords now exported to the United States were manufactured in Canada into pulp and paper in the proportions required, say for news print, it would mean an investment of about \$21,700,000 for plant, and would employ directly 6,400 men, with a total wage bill of over \$3,000,000 a year, not to speak of the commercial interests it would develop in association with the industry. The creation of this home industry yielding a factory wage bill greater than the whole value of the wood now exported would naturally give the timber limit owner, and the owner of the small wood lot a better market at home than the present one abroad for pulp wood. Even the United States manufacturer would not be a loser altogether, for many individual mill owners would transfer their plants to Canada and found a business which would ultimately bring a better return to their capital than now because the natural conditions are here more favourable to the business, since Canada has not only the wood and water-power, but men who understand wood craft better than any in the world.

One danger that is soon to be faced, however, is that railways will soon have to be built, largely at the cost of this industry, to reach fresh supplies of timber when the areas now drawn on are stripped. If to the consumption of Canadian mills, 600,000 to 800,000 cords a year, we add the consumption of Canadian pulp and pulp wood by United States mills, even the present rate of depletion will soon call for the use of railways which will add to the cost of production, and handicap this country in competition with pulp and paper manufacturing countries like Norway and Sweden.

Looked at from a national standpoint this desolation of whole districts for the paltry price of pulp wood is wanton improvidence. In the province of Quebec especially, where the soil is comparatively thin, we see the curse of barrenness gradually creeping over large districts through the erosions of spring freshets, while in summer not a sign of flowing water is to be seen where streams flowed perennially within the memory of men now living. The low summer level of many eastern townships rivers in recent years is no doubt the symptom of permanent changes affecting the water-powers, and damaging the pulp and paper interests particularly. What is taking place in the eastern townships, and on the north shore by stripping timber from the land around the sources of the streams will surely overtake the regions on both sides of the St. Lawrence, and a St. Lawrence valley that is subject to spring freshets and summer droughts from this cause means an impoverished Quebec. What will become of the great dairy industry, not to speak of other agriculture and manufacturing interests of the province, in such a case?

What is wanted, then, more especially in Quebec, is men of influence in public affairs who will teach the people the lesson of Mesopotamia, of Greece and of Andalusia,—Andalusia once the synonym of fertility and abundance, now a scene of poverty and decay.

Administrators are wanted, not only in Quebec but in other provinces, who will by some means find a revenue without devastating their native land and maiming that resource which is the parent of all resources, the forest.



THE EFFECTS OF FIRE IN A WESTERN FOREST.



THE PUBLISHER'S INTEREST IN FORESTRY.

J. F. MACKAY, BUSINESS MANAGER OF THE TORONTO 'GLOBE.'

It would seem like carrying coals to Newcastle for an outsider like myself to attempt to say anything, either of interest or profit, to the experts who constitute this splendid gathering. I take it, however, as no small compliment to the fraternity to which I belong that we have been asked to join with you in doing something to further the great cause in the interests of which this association has been formed, and this convention is being held. I would also say that I appreciate the compliment that has been paid to myself in being asked to read this paper. As a charter member of the Canadian Forestry Association, and as founder of *Rod and Gun*, the first official organ of this association, I join with all concerned in rejoicing over the achievements up to date. The subject of 'forestry' can never be given narrow limits. The individual can do a little, municipalities can do something, and the province can do quite a lot, but, after all, it is from the national standpoint that the subject must be treated if it is to receive the attention it deserves, and if great things are to be accomplished. While forestry affects everybody, it is as wide as the boundaries of the Dominion. There is, as far as I can see, no valid reason whereby any citizen of Canada could excuse himself for failing to become a member of the Canadian Forestry Association. It certainly could not be on the grounds of 'no interest,' for from the firewood of the humblest householder, or the maple that shelters his home to the ties used in the giant railway enterprises of the day, or the pulpwood for the ponderous paper machines, I fail to find any man or class of men to whom the forest is not a friend.

But it is from no sentimental reason that I come before you on this occasion. There is little of the æsthetic about the newspaper publisher's interest in forestry. I suppose it might be said to be pure commercialized selfishness. I believe I am well within the mark when I say that there is not in all the range of social or industrial life any class of men who should, for their own sakes, regard this subject with more favour than the publishers of newspapers.

It has been frequently pointed out that while the varied uses to which wood is put are steadily narrowing, yet the call upon the forest from year to year is for more, more, more of its produce. The explanation of this is not hard to find. Coal, oil, gas and other substances are superseding wood for fuel; steel is taking its place for structure work and for shipbuilding, but for the making of paper—the consumption of which grows with gigantic strides—the spruce tree owns practically no rival.

If it is our first boast commercially that Canada is the 'granary of the empire,' we may be proud to claim as a good second, that Canada is also the forest storehouse of the empire. In the opinion of not a few well-informed men, the subject of forestry is next in importance in this country to that of agriculture. Is it receiving then the attention it deserves? Far from it, I fear. When we consider the great sums that are spent by the governments and individuals to prevent the depletion of the fish that swarm in the lakes and rivers of the country, or the extinction of the game that roam the forests, and how little attention, comparatively, is paid to the preservation of the forests, which are in reality absolutely essential to the life of both fish and game, one wonders if the methods hitherto adopted do not require considerable revising.

I take it that for the purpose of this paper, you will do me the kindness to admit that the newspaper is an institution which it is desirable to perpetuate and to encourage—although, I fancy, from opinions I have seen credited to at least one distinguished Canadian—there might not be, under other circumstances, an altogether unanimity of opinion on the matter. It is not my intention in this paper to attempt anything quite so foolhardy as to work up a sensation over a prospective paper famine. Of course, were I able to do this, a greater interest would be added to this paper than is likely under the circumstances to attach to it. The facts are unfortunately against

any such contention, and this audience, unfortunately for me, is too well posted on the facts for any liberties to be taken therewith. The statisticians for once own up to their inability to estimate even approximately, the amount of pulpwood standing in the Dominion to-day, but all agree that one billion cords is well within the mark, constituting easily the largest spruce forests in the world. The quality also is admitted by rivals to be the best. The enormous extent and value of this heritage we ourselves are only beginning to view in its proper proportion. Taking a billion cords as a basis, Canada is in a position to supply all the pulpwood needed for this continent and Great Britain for at least a century or perhaps two, unless the demand increases at a much more rapid date than it has done in the past. But why speak of a century, or even two centuries, of pulpwood any more than a century's supply of wheat or of fish or any other product, which the Creator in His wisdom has made reproductive? In view of the fact that a spruce forest will reproduce itself under proper forestry regulations in thirty years, a paper mill having to-day a million cords of standing pulpwood, from seven inches up, can justly claim to have a perpetual supply of raw material for an output of one hundred tons of paper per day. Wilful waste is as great a wrong on the part of the millionaire as on the part of the pauper, and retribution is just as likely to follow in the one case as in the other. As Canadians we must realize that we will be held strictly to account for the use or abuse we make of the resources placed at our disposal. The judgment of the future will be that we of to-day have been wise, or otherwise, as we husbanded or slaughtered this great gift of providence.

My task would therefore be an easier one were I writing probably about the beginning of the twenty-first century, instead of at the opening of the twentieth.

Fortunately we have not far to go in seeking an object lesson in the utter folly of defying nature's laws in these matters. The phrase, 'an inexhaustible supply,' which we glibly use in Canada to-day in talking of our pulpwood forests, was just as freely used in the United States but a very few years ago. Thus chloroformed, they failed to adopt proper forest regulations, with the result that to-day they find themselves depending on foreign countries for about one-half of their annual supply of pulpwood.

Norway and Sweden have also failed to adopt precautionary measures, and there, too, what was once considered an inexhaustible store is now said to be only sufficient to maintain their present consumption for a decade, or thereabouts. Germany alone has properly sized up the situation, and Canada would do well to follow her footsteps as far as practicable. In Germany, over fifty per cent of the reproduction is done by artificial means, and this is found to be most satisfactory. After the crop is produced there is still a chance of improving it by accelerating its development. It is possible to increase the production two or three fold by a proper use of the axe. To-day we are told by the Washington authorities that the United States will have to pay millions upon millions of dollars to buy back for forest reserves another hundred million acres of lands, their present reserves being but 150 million acres, whereas at least 250 million acres are required. Canada will be held doubly guilty should she fail to profit by this information, for she will have sinned against greater light.

The interest of the newspaper publisher in the preservation of the forest, while direct and vital, is one that is quite likely to be overlooked in this country. The greatest danger lies in the very fact that the supply is so enormous. It is not necessary, however, that a man must be either a prophet or the son of a prophet to foresee that unless protective and precautionary measures are adopted, it will be but a comparatively short time before the price of the publishers' raw material will begin to go up. If it be true that the law of supply and demand regulates prices—although in this age of great trusts and combines one is likely to have his faith in this law somewhat shaken—then the price of paper must go up as the supply of pulpwood becomes less. The demand on the spruce forest is likely to grow in the near future at a far greater rate than it has done in the past—rapid as has been the development of the pulpwood industry. The most casual observer can see that it is to-day only in its swaddling

clothes. During the past twenty-five years the number of papers issued in Canada has almost trebled, while according to the newspaper directories, the aggregate circulations have increased at even a more rapid rate. Striking as these figures are, they are likely to be far short of the increase during the next decade, in view of the rapid settlement now taking place throughout northern Ontario, Quebec and western Canada.

The consumption of newspaper in Canada to-day, as nearly as it can be got at, is 30,000 tons per annum, at a valuation at the printing office of about one and a half million dollars. About one and three-quarter million dollars' worth of newspaper is now exported from Canada annually. Surely an industry that can show such figures is worthy of careful consideration. But it is not so much the home demand that is likely to devastate the land—although this will be no inconsiderable quantity shortly, and should, we think, be a first charge upon the attention of the authorities. It is the foreigner who is most to be feared. The American method of doing business is to make contracts with jobbers or squatters who acquire lots of land and skin them off bare. As the land is largely worthless for farming, it becomes altogether useless, especially after the fire has once gone over it. Where this method is followed the Canadian receives about \$3.50 a cord, and his land is left a wilderness. Much can therefore be said on behalf of the proposal, to put such restrictions upon the export of the pulpwood, especially to the United States, as will either compel its manufacture into wood pulp or paper in this country, and thereby secure the expenditure of about \$25 or \$30 per cord on this side of the line, or, failing to accomplish this, would at least add half a million dollars annually to the Dominion revenue. I observe that the tariff commission was informed the other day at Three Rivers, by the representatives of one of the largest pulp and paper making concerns in Canada, that the Dominion loses \$1,792,000 annually through the export of pulpwood to the United States. A certain portion of this money might judiciously be spent in enforcing scientific forestry regulations. Such an impost the publisher can advocate both on patriotic and selfish grounds. It will enrich and develop his country, and it will at the same time give him a wider market in which to buy his raw material. In addition to this the company with from half a million to three million dollars invested in a pulp and paper making plant is likely to become one of the most ardent advocates of the scientific forest regulations to be found in the country, for a plant of these dimensions is not to be hawked about the country in a carpet bag. The splendid results that have followed the imposition of restrictions on the export of logs may be cited as an additional reason why our governments should lose no time in taking some steps that will tend to stop the prodigal destruction that is at present taking place in our spruce forests. One does not regard legislation of this nature with any great degree of pleasure or pride, for it is not calculated to cultivate those sentiments of amity and brotherhood which we all so much desire to see developed between the two great American nations, but, in the words of the distinguished forester from Washington, whose addresses at this convention have been so thoroughly enjoyable, 'Forestry is a business proposition,' and all we ask is, to use the familiar words of President Roosevelt, 'a square deal.' If this vast heritage must be destroyed, let it be done at the greatest possible cost to the destroyers. I hold no brief for the Canadian pulp manufacturers, but I do not believe that an export duty of one dollar per cord would reduce the price paid by the American to the jobber one cent. This is a big question on which no one can dogmatize.

When nature endowed Canada with her enormous spruce forests, her great streams and waterfalls, she intended this to be the greatest paper-making country in the world, and only man's cupidity or stupidity can prevent this from being the case.

We have the authority of the Dominion statistician for the statement that forty per cent of Canada consists of forest, and that probably one-half of this is spruce. There must, therefore, be about 450,000,000 acres of spruce area in Canada, and on a basis of ten tons of ground wood pulp per acre, there are 4,500,000,000 tons of wood pulp

in sight in Canada. As 90,000 acres will supply the annual demand of Great Britain and the United States, it still requires big figures to estimate how many years it will take to denude the Canadian forests. It is not, therefore, fear of a pulp famine that should agitate the publisher in considering the question, but the certainty of an increased cost, as his material, especially that close at hand to rail or water, grows less and less. The same quality of clear pine that has been sold in New York within twelve months for eighty dollars per thousand was sold for twenty dollars per thousand within the memory of men still active in business. And yet the man who would then have prophesied that such would have taken place would have been considered fit for an asylum. It is object lessons such as this that lead one to say that newspaper publishers do not view with equanimity the destruction of the Canadian spruce forests now going on.

Given proper forestry regulations, however, the Canadian user of newspaper may consider his lot in respect to raw material a particularly happy one.

The following figures taken from the twelfth census of the United States may be interesting as showing the extent to which that country is now drawing on Canada for the supply of wood pulp:—

	Cords.	Cost.
Domestic spruce for ground wood	598,229	\$2,855,872
Domestic spruce for sulphite and soda fibre..	561,889	2,731,070
Canadian spruce for ground wood.. . . .	120,820	868,187
Canadian spruce for sulphite and soda fibre..	228,264	1,404,308
	<hr/> 1,509,202	<hr/> \$7,859,437

To a great statesman is attributed the query, 'What has posterity done for us?' I close by setting in contrast to this another quotation: He visiteth 'the sins of the fathers upon the children to the third and fourth generation.'

THE FOREST AND THE MINE.

FREDERICK KEFFER.

Manager, British Columbia Copper Co.

Preservation of the forests touches the mining industry in several most important points. Inasmuch as a plentiful supply of timber is an essential factor in mining operations, miners are always deeply concerned as to the sources of supply, especially as regards accessibility, permanence and cost; and further, wood being frequently the only available fuel for power and heat, an abundant supply of this fuel may determine whether the mine can be profitably operated or not.

Aside from these direct uses of timber and fuel, there is the question of water supply for power, concentration, cyaniding, steam and other purposes, with which it is to be feared the average miner in no way associates the preservation of the forest.

That miner is indeed a rare bird who, interested though he may be in his own timber resources, ever looks into the distant future or cares in the least where those who succeed him will secure their timber. The sole aim of the average miner or mining company is to extract the ore from the mine in the shortest possible time and in the most economical manner; and as to the fellow in the next generation, why he will have to look out for himself.

Miners and prospectors as a class seldom have any feeling whatever for trees of slow growth, which once destroyed can never be replaced during the life of any man now living. On the contrary, prospectors frequently are guilty of wanton destruction, and a number of cases are known to me where they have deliberately burned off whole tracts of splendid forest for the sole reason that prospecting would thereby be rendered

easier. And as for wood cutters getting out timbers and cordwood, while the little trees are only spared because it does not pay to cut them up, no care is ever taken to protect even these from being ruined by the fall of the larger ones.

Of course all this careless work comes about through reason of the seemingly inexhaustible forest resources of the country. When the writer first came to British Columbia from a residence in Mexico and Arizona, where timber was exceedingly scarce and expensive, and where the available fuel consisted of grease wood roots, mesquit bush and cactus stalks, it took a long time for him to become reconciled and accustomed to what seemed like wanton slaughter of the forests.

The miles upon miles of stumps, of fallen and blackened trunks and general wreck of once splendid forests vividly impressed him as being a fairly sinful and wicked waste of the country's resources; this impression being actuated by the knowledge that but a fraction of the wood had actually been utilized.

But as with vice, 'Familiar with her face,' a long residence in the country and familiarity with the ever progressing waste of the forests, gradually hardens one to the iniquity of it all, so much so that in due time one becomes almost if not quite as great a sinner as any of his neighbours.

Under these conditions which universally prevail over all this part of the country, there seems to be but one hope for the forests, and that hope lies in an intelligent supervision of the public forest lands of the country through a permanent government department of forestry, officered by men trained to their work, and familiar with the methods obtaining in European countries, particularly Germany, that most methodical of lands, where forestry has been studied and practised some three hundred years. The mining industry of British Columbia, (and in Canada generally for that matter) is still in its infancy, and bids fair to assume in time immense proportions. From this standpoint alone, narrow though it may be, it surely would behoove the people though their government to make sure for all time their timber and lumber supplies, and to preserve the forests as an unfailing source of wealth. For if only the private holders of forest lands can be brought to regard their property as a capital investment from which the annual crop of matured trees is their interest, forestry will have been put upon a rational basis, and with the government caring for the public reserves, the wanton destruction of the forests may be checked.

THE WOOD SUPPLY OF THE CANADIAN MANUFACTURER.

JAS. KERR OSBORNE, VICE-PRESIDENT MASSEY-HARRIS COMPANY.

It is with the greatest diffidence that I write even the shortest kind of paper on this subject:

In dealing with it, I wish to say, at the outset, that it will not be in a scientific or technical way; but purely from a business and commercial standpoint, and will be largely confined to the wood supply as it affects the makers of agricultural implements.

Twenty-five years ago, wood entered far more largely into the manufacture of agricultural implements than at present. Then large supplies of various woods were available, and at moderate cost, and steel had not then become the basis of structural mechanics as now prevails. Year by year steel has replaced wood. Beams, trusses, tees, angles, sheets in infinitude of variety have taken the place of numerous kinds of woods, until to-day in the modern agricultural implement, steel, not wood, is the prevailing element.

This is true not only as regards the manufacture of agricultural implements, but also in respect of the building of houses, warehouses, office buildings, factories, bridges, railway cars, &c., &c., in all of which steel has to an enormous extent superseded the use of wood. It is well that this is the case, otherwise the drain upon the wood supply of the world would have become much more acute than it is.

Canada has been a favoured nation in regard to her vast supplies of timber. In the older portions of the country, where smiling farms have taken the place of the primeval forest, the wood supply has been largely depleted, but the new lands now opening up to the north bid fair to renew and replenish, and furnish supplies of certain kinds available for many years to come.

In variety of woods, Canada has also been favoured, producing hickory, white ash, black ash, rock and soft elms, white and red oaks, hard and soft maples, birch, hemlock, fir, spruce and white and red pine. The scope of this short article will not embrace Canadian pine, but will deal only with the so-called hardwoods.

In earlier years, hickory, white ash, rock elm and oak were produced largely in Canada. Now these varieties are obtainable in very limited quantities. These are the woods most highly prized by the manufacturers on account of their great strength and adaptability for such a variety of purposes. The supplies of these woods are practically exhausted in Canada, and so far as my knowledge extends no attempt has ever been made to replant or replenish the supplies of these valuable timbers.

Failing in supplies of these more desirable varieties, the manufacturer has been obliged to have recourse to other kinds of wood, so that of late years hard and soft maple, black ash, soft elm, birch and basswood have come into large commercial use. For many purposes oak is still the most desirable kind of wood, but the supplies of this variety come almost exclusively from the southern and southwestern states. Every bending factory in Canada is practically dependent upon the southern states for their supplies of oak and hickory. The south-eastern states are the chief sources of supply, and the freight rates to points in Ontario vary in cost from \$10 to \$15 per 1,000 ft. B. M.

During late years, cotton lands in the southern states have greatly increased in value and I have been told that thousands of beautiful hickory trees there have been girdled so that they would die quickly, and thus enable the land to be more rapidly brought under cotton cultivation.

Whether the forestry laws of the United States permit this or not, I cannot say, but it seems to me a wanton destruction of valuable timber.

The chief source of anxiety to the Canadian implement and vehicle manufacturer is his wood supply for poles or tongues. Every binder, reaper, mower, drill, cultivator, wagon or sleigh made in Canada requires a pole. I estimate that from 200,000 to 250,000 poles are required annually for these machines made in Canada. The quantity used is constantly increasing; the supply is rapidly decreasing, and as far as a Canadian supply is concerned has reached the vanishing point.

Twenty-five years ago the counties of Essex, Kent, Lambton and Huron in Ontario supplied vast quantities of white ash from which wagon and implement poles were made. The total coming from these counties now would not give a supply to one of our smallest factories.

Canadian oak is also about all used up. Any oak poles used in Canada come from the United States. Practically all the poles or tongues used for agricultural implements, both in Canada and United States, are made from Long Leaf Southern pine. Not only is this material used for this purpose, but also in car building, and for a variety of other purposes, for which Canadian white or red pine is not suitable.

The Long Leaf yellow pine grown in the states of Georgia, Florida, Alabama, Mississippi and Louisiana seems to be specially adapted for poles for agricultural implements. It is very strong and tough, being full of resin or pitch, and it grows large and free from knots, so that it is the most desirable timber for the purpose obtainable. The freight on this from the mills where it is produced to points in Canada where it is used, runs from \$12 to \$16 per 1000 feet B.M. During the past year we have experimented to some extent in Canadian birch, and we are of the opinion that if properly selected it would be suitable for the purpose. The growth of large birch trees is confined to northern Ontario and Quebec, and while moderate supplies of suitable timber might be obtained it would not be possible to secure sufficient to meet the large demand for the purpose indicated.

The production in Canada of soft elm and basswood is still large, and these lumbers come in greater or lesser quantity from all parts of Ontario. These varieties are used not only by agricultural implement manufacturers, but by piano and organ makers besides large quantities are exported.

The selected and best qualities are used for piano keys, and for export trade, and immense quantities of the lower grades are used for packing cases. This is also true in regard to spruce and hemlock.

Canadian hard maple is still in good supply, coming chiefly from northern Ontario, and is an excellent wood for many purposes.

The lumber consumption of the Massey-Harris Company exceeds ten million feet annually and with the exception of pole stock, oak and whitewood is principally drawn from Canadian sources. The value of their annual purchases is about \$260,000, and the distribution of this sum among the mill men and farmers of Canada adds materially to their resources.

As before stated, the scope of this little paper is very limited and does not deal in any way with the pine and spruce supplies of the extreme east, west and north, which add materially to the national wealth. I am dealing exclusively with the 'Wood Supply' as it affects the Canadian makers of vehicles and agricultural implements, showing what they use and where they get it.

Different opinions may and doubtless do prevail in regard to the conserving of our timber supplies so that they will yield the greatest good to the people and add most largely to the natural wealth, and I am sure that along these lines your convention will yield valuable information.

I offer the following among other suggestions that will doubtless come before you:—

Encourage the planting of the more valuable varieties of timber, which are gradually becoming extinct in Canada.

Foster the protection of standing timber that is still growing and increasing in value.

As far as possible draw our timber supplies from lands where settlement is crowding clearing.

Where our own timber is growing and increasing in value, use the other fellow's, *i.e.*, draw on outside supplies and conserve our own.

Hoping I have not trespassed too much on the time of your convention.

HON. JEAN PREVOST.

MINISTER OF COLONIZATION AND MINES FOR THE PROVINCE OF QUEBEC.

I am highly gratified indeed to be afforded an opportunity to co-operate to the work of a convention, the proceedings of which, I hope, will bring about the most satisfactory results towards furthering the prosperity of this country. The people of Canada will owe a debt of gratitude to the federal government if the latter's efforts attain the commendable object it had in view. True it is that the control of forest lands lies with the provinces, and that they cannot be deprived of their rights, yet I am willing to recognize that the federal government, without interfering with such constitutional rights, can devise the means of contributing in a perfectly constitutional manner to the preservation and reproduction of forests in the whole Dominion. I am ready, as a member of the Quebec administration, to give my most hearty and most efficient support to the carrying out of an undertaking which we look upon as desirable and in a high degree patriotic. I am quite willing also to admit that we have perhaps carried somewhat too far the deforestation in the province of Quebec, but we were compelled so to do by the necessity we found ourselves in to provide sufficient revenue

for the management of public affairs. And this unfortunate obligation is imposed upon us by the British North America Act itself, which provides very inadequate revenue to the provinces for the requirements of effective government. Although we are forced to derive the bulk of our revenue from the forests, we did not, however, lose sight of the fact that our principal asset is the forest, and which we care least to depreciate. For several years past, the province of Quebec has followed a policy for the preservation of its forests, and I doubt if of all the provinces of the Dominion, it is not in ours that the largest area set aside for forest reserves is not to be found. These reserves are located in districts where colonization offers slight advantages for colonizing purposes. Other reserves will soon be laid aside and in none of them will the settler be allowed to pitch camp for many years to come. It is a well known theory that rivers derive their supply of water from mountains and forests, and it is as much for regulating the flow of water in our rivers and water-powers as for keeping up the production of our forests that we have already set aside certain forest reserves and intend creating more. And in order to better effect the education of the people in the province of Quebec, our government has now in the famous Yale University two pupils who will soon be acting among our people as duly qualified instructors. We have also established colonization reserves alongside those above referred to, and they are located in those districts which are better suited for colonizing purposes. These will soon satisfy all the requirements, and it is our intention then to discourage the settler from colonizing outside these limits, by affording him special privileges. We expect the best of results from this policy, and the sooner the better. In order to attain this object, we would gladly accept the co-operation of the Dominion government in granting the provinces forestry stations where theory would be taught, where example would be set for the preservation of forests and where a uniform impulse would be given to the operation and reproduction of forests. If it is at all in the power of the Dominion government to help the provinces, it seems to me that this is the best possible means.

If our farmers have drawn all that they possibly could out of the timber, it must not be inferred that there has been a wholesale destruction of the forests. I doubt that as many saw-mills will be met with in the sister provinces as will be found in our French country towns. You will see them in almost every parish, and they are the basis of a pretty profitable business. It must be noted that these saw-mills do not derive their supply of logs from the timber limits, but from the farmers' lands. This state of things has been going on for many years, which goes to show that there is still a considerable proportion of dimension timber and sawn lumber on the farmers' lots and that they have been successful to a certain extent in insuring the reproduction of trees.

Plantation of ornamental trees is also taking much extension in our province, and they are not few in number, those small towns which are now growing in the shade of the Canadian maple, the elm, the ash, the birch, as well as the pine, the fir and the cedar.

FIRES.

Now, is it a pertinent question to ask whether the settler, at least in our province of Quebec, is really such a scourge of the forest as to deserve the aspersion which is so readily cast upon him? He is certainly guilty, and his conduct cannot be too

strongly condemned, he through carelessness starts a disastrous fire in the remote district where he settled down, and it is of capital importance to take the means to prevent such calamities, but quite different is the settler, who, under reasonable conditions, clears the forest to make a home for his family. Under such conditions,, would it not be a crime to stop deforestation for the sole purpose of keeping the timber for the owners? It would simply mean a check to the expansion of a nation, it would be asking it to multiply on the same restricted territory, or to emigrate to a foreign land. The French Canadian is too much attached to his country, the land of his forefathers, to his parish and to his home, to entertain even for one instant such a proposition, and no matter under what form it is put to him, he will know how to detect and reject it. His province is dotted with small north-west's which deserve all his ambition, and where the forest will unavoidably yield to the cultivated land.

DR. J. T. ROTHROCK.

FOREST COMMISSIONER FOR PENNSYLVANIA.

I wish to congratulate you all on the magnificent success of this meeting. I have come here from the Quaker State of Pennsylvania in the hopes of deriving some inspiration for my own home work, and I am sure I have not been disappointed. I wish to congratulate you also on your foresight in reserving, or in endeavouring to reserve, so much of your land as public land in possession of the government. I have had a little experience along that line to which I wish to call your attention. In the early history of my state we recognized the fact that the first essential for the commonwealth was citizens, and in order to induce citizens to settle within our limits, the land was sold to them at a merely nominal figure—26 $\frac{3}{4}$ cents an acre. This, you will remember, was for land covered with as fine pine, oak and hickory as ever grew upon the face of the earth. My attention has been called to sections of white pine grown in the Canadian forests six feet in diameter. These trees were not uncommon forty years ago in the forests of Pennsylvania. I began life as a civil engineer. I remember one morning cutting down two white pine trees in the way of our line, one six feet across the stump, and the other six feet four inches. And such trees were by no means uncommon then. To-day a white pine tree six feet in diameter is not to be found within the limits of the state of Pennsylvania. I am not a very old man, but in my lifetime I have seen one-sixth of the area of the state of Pennsylvania pass from a productive to a non-productive condition. You need not go to the Holy Land, nor to any part of the old world, to find the desert which has been made by the removal of the forests. I can take you to the hillsides of Pennsylvania and show you exactly that condition—and that in a state not three centuries old. The great heritage which should have been preserved for those who come after us has been ruthlessly destroyed. I have no quarrel with the lumbermen, I am simply stating the facts.

And now let me tell you the condition of affairs in Pennsylvania in relation to the forestry movement. Our most far-seeing citizens recognized the fact that there must be a limit to this desolation that was being brought upon the state. A forestry movement was inaugurated there. But we soon found that we had reached the limit of our successful work because there was no department of forestry. At first, all our

efforts were made through the Department of Agriculture, but we soon found that there were dominant interests there that we could not control. So we decided that it would be best for our purposes to have a Department of Forestry, a department on the same plane as the Department of Instruction, the Department of the Interior, the State Department, or any other, a department that could speak out on forestry questions, and put through measures necessary for the largest usefulness and most rapid development of the forestry interest. Now, we have got that Department of Forestry. And now I would like to introduce here an idea which I have not heard mentioned by any of the previous speakers. One morning I was sent for by the President of the Senate of Pennsylvania. He said to me: 'What have you been doing?' I did not know what I was being arraigned for, so I said, 'Senator, will you please explain yourself, I do not know what you mean.' 'Well,' he said, 'there is the devil to pay this morning.' I thought if I was responsible for the 'devil to pay' in Pennsylvania I was guilty of a great crime. 'Well,' said he, 'there is not a member of our legislature, either in the house of representatives or in the senate, whose desk is not flooded with letters demanding the creation of a Department of Forestry.'

Now, this associates itself very nicely with a little incident related by Mr. Aubrey White. He said that he had spoken on the aesthetic influences of forestry at the convention in Washington, and after he had finished his address a lady said to him: 'In the name of eight hundred thousand ladies in the United States I wish to thank you for what you said.' Mr. White, keen as he is, did not realize, I fear, the full import of that statement. We have in the state of Pennsylvania an organization known as the Federated Women's Clubs. They are bound together by the closest ties of affiliation. Whatever makes for the decencies of life, for the comfort and protection of the home, whatever makes for good citizenship, these ladies are interested in. Just one week before the time I was arraigned for having 'the devil to pay' in Pennsylvania, in an hour of desperation I sat down and wrote to the secretary of the Federated Clubs of Women in the state of Pennsylvania. In one hour from the time she received that message the telephone and telegraph wires tingled all over the state, and, just about the time this measure was to come up for its third reading and final passage, letters from women from all over the state were placed upon the senators' tables. Gentlemen of the Canadian Forestry Association, I ask you, have you in this great work invoked the aid of the ladies of Canada? I know that some member may say that he would like to see a lady approach him on such a subject. Well, I have heard such talk before. If a lady were to approach him on such a subject, being a gentleman, he would give her a very careful hearing and, whatever opinion he may have had before, when she was done with him he would quietly vote as she had asked him to—for you may be very certain that when the women of a country take up such a cause as this that cause must succeed.

I have been much interested in the papers and discussions on Canadian forestry development. A part of my recreation has been delving in some of the old historical documents, and I would like to call the attention of this convention to the fact that the oldest lumbering district in the new world belongs to the Dominion of Canada. I think we are coming more and more to recognize the fact that, long before Columbus—peace to his ashes—discovered the West India islands, this land had been visited by the Northmen. I think that is a fact which admits of no doubt whatever. It is well

known that, prior to the great Columbian celebration in Chicago, a search was made in the library at Rome for such documents as might cast light upon the early settlement of this country. It is a well known fact—I have the translation of the document found there—that in the very year when Columbus discovered America, the Pope had sent a messenger to see what had become of the lost churches on the coast of Greenland. And there amidst the desolations of the Arctic regions, to-day you will find a tombstone ‘Vigdés, daughter of M., may God rest her soul.’ This tombstone was erected centuries before the discovery of America by Columbus. It is not to be believed that a people with the spirit of adventure such as possessed those Northmen would not sail on until they had reached the main land, or that they would fail to recognize that the better climate lay to the south, and, recognizing that, would fail to reach the more favoured country. And another part of the tradition which is probably true, is that a cargo of ships’ spars was sold in the open port of Bremen which probably came from the region which is now known as Newfoundland, long before 1492.

A VOICE.—Labrador.

Dr. ROTHROCK.—Probably Newfoundland or Labrador.

Now, I wish to speak about the forest school in Pennsylvania. We have acquired already about a million acres of land either in possession of the state or have it in process of acquisition. We have planted out thousands of young trees, and we are raising in our nurseries hundreds of thousands of others. We have established a forest school. And, being myself of plebeian birth and accustomed to earn my living with my hands, I naturally believe that the best preparation and the strongest foundation upon which to build a character is knowing how to do an honest day’s work. And, in giving shape to this forest school, we have made it the duty of the pupils there to work half of the time. Our men there who are studying the principles of the forest are hewing logs in the woods; they are making roads, they are managing broncho ponies, they are becoming accomplished woodsmen; and, whatever may be their studies, they are supposed to earn what it costs the state to educate them. We are endeavouring to base that little school upon the high moral and honourable tone of West Point and Annapolis. We pay our pupils for obtaining their education. We take them by examination, physical and mental, from all over the state, and we hope to develop in time into something that we can boast about. We have not attained that yet, but we are on the road to it.

I have already said that our pupils are paid, as the cadets at West Point and Annapolis are, for receiving their education. And why? Because we want a class of boys who, we can feel from the first, recognize their duty to the government—no other master than the public good should come between them and their work. The high principles of honour which obtain in these schools we have endeavoured to secure. But there was something better than all that. I was much struck by a remark made by Mr. White to the effect that in selecting rangers for your Canadian woods, politics were left out, that the man who had the best acquaintance with the men in the region selected the rangers for a particular district. After he had told us that, it did not surprise me when he went on to state that the number of fires had been reduced to a minimum. That was the natural consequence of Mr. White’s policy. Now, in order to fight against the introduction of politics into the forestry policy of

Pennsylvania, for a policy once started must be persevered in for years, we are educating our boys at the expense of the state. So, when a politician comes to us and says: I have got a man who is a good man in his district, who is a good republican or a good democrat, as the case may be, we can say: Get thee behind me, Satan (applause and laughter)—we have educated the young men at the expense of the state, and they shall have the preference (applause). These young men have had the duty of loyalty to the commonwealth ground into them and it is there so that they will never lose it.

Now, with regard to the growth of railroad ties, I would like to report from Pennsylvania that we have already set out there in the neighbourhood of a million young locust trees to be grown for railroad ties. One railroad has done that. I would like to make one remark also about the fires we have heard so much about. We have in our office in Pennsylvania six thousand references as to the cause of various fires. These come from all over the state. And it turns out that about sixty per cent of the fires in the past ten years in the state of Pennsylvania have been started by the small farmer burning brush. The hunter and the fisherman are largely responsible for the remainder. The railroads of Pennsylvania, though they have been abused as have those of Canada—and probably with some reason—divide with the hunter and fisherman and the tramp the responsibility of the other forty per cent. I do not wish to belittle the railroads by associating them with tramps.

I will not take up more of your time. I thank you for the privilege of appearing before you. I do not feel that I am entirely a stranger to Canada or to your soil. Forty-one years ago—that is a good long time—I was hustling around at St. James, between the headwaters of the Fraser river, Lake Tatleh, and the Stikine river, so that I know at least something about Canada. I had the honour of building and living in the first house in the collection of houses now known as Bulkley House. When I see upon this wall the stars and stripes of my own country nestling under the protection of your world-embracing flag I remember that we are of one blood and of one race, though of two governments, of governments that are working together in generous rivalry in developing the wonderful resources of this great continent. And may it always so continue.

HON. W. C. EDWARDS.

When I had the privilege of addressing you yesterday afternoon I made a statement with regard to a property on the Gatineau that I had bought. I said that I had bought a property in 1871 on which there was then a farm, and that now, thirty-four years later there is on that land a dense forest of pine timber. I sent a photographer up to take pictures of some of the trees. I am sorry to say he has not done it as well as I would like to have had it done. However the photographs which I have here represent the trees which I mentioned yesterday. I will leave the photographs here and any who desire to inspect them will have an opportunity to do so. On that land there is now a dense forest of timber, some large enough to make saw-logs. This, of course, is an extraordinary growth so far as pine is concerned. I might here remark that in the discussions that have taken place here pine and spruce timber have been almost exclusively referred to, other timber hardly having been mentioned. With regard to protecting our forests, I am afraid that the idea too much prevails that we are only to

protect the pine and the spruce. I am not one of those who entertain that view at all. I think the forests should be protected in their entirety. My view is that with the rapid development in the application of electrical and chemical science, in a few years everything that grows in the forests of any country will be a valuable asset. Every twig that grows in the forest will, in the future, have value. Let me give you one illustration of the usefulness of our timber and the great desirability of preserving it and promoting its growth. There are those who believe that when the forests of the United States are exhausted, Canada will be resorted to for the supply of timber for that country—a very erroneous idea indeed. You have here displayed on the wall a statement showing the quantity of timber available for cutting in Canada—532,000,000,000 feet. Now 532,000,000,000 feet would supply the United States at its present rate of consumption of timber just eleven years. It is simply appalling to think of timber being cut to such an extent that all the timber of Canada would only supply the consumption of the United States for eleven years. It is fortunate indeed for the world that, as timber is disappearing other materials are coming into use to take its place. Were it not for the extensive use of cement to-day, together with iron and steel, for construction work, those who are engaged in construction would not know where to look for supplies. I simply mention this fact as showing the desirability of Canadians preserving the great estate that they have and promoting the growth of timber. And I have submitted these photographs simply to show the possibilities of the growth of timber.

It is near our time for mid-day adjournment, and I do not wish to detain you longer. But the Chairman has desired me to say something with regard to railways and the possibilities of preventing fire therefrom. The last speaker minimized, so far as Pennsylvania is concerned at all events, the destruction of the forests by railways. I am afraid that just as good provisions as exist in Pennsylvania have not existed in Canada or the destruction of forests by our railways would not be so great as it has been. For my part, I regard railways as one of the prime necessities of the country. But we must minimize the destruction of our forests by railways to the greatest extent possible. I can think of no scheme whereby this can be done otherwise than by the careful patrolling the total length of a railway by guardians. But I would like to say this—that a railway that is going to do incalculable good for Canada is now being promoted through the great northern timber belt of the province of Quebec. In the construction of that railway the most careful considerations should prevail, or otherwise the northerly and northwesterly winds which prevail will cause the destruction of our great timber estate north of the Ottawa and St. Lawrence rivers. Now I fear that if along that line of railway, in parts of the country that are not suitable for settlement, if the settlers are allowed to go there at all, the destruction of the forests will be inevitable—there is no question about that. I am at one with my friend from the province of Quebec who spoke this morning. I hope he will carry out precisely what he said. If he does, a new era is at hand for the people of the province of Quebec.

I will not dwell longer upon these points, but I would simply ask those who are assembled here if they think it possible, staunch thoroughbred absolute freetrader like myself to leave this assemblage without endeavouring to refute as well as I can the fallacious statements that have been made here to-day with regard to the trade question

(loud applause and laughter). I enjoyed immensely the two papers that were read. But when it came down to a proposal to restrict the trade of Canadians, I could not but feel the strongest resentment. I am opposed, utterly opposed to the theory and practice of the exportation of our raw material.

A Voice.—That is just the idea.

Hon. Mr. EDWARDS.—What does this gentleman want us to do? He wants us to go only half way. He wants us not to export the timber but to export the pulp. In exporting pulp what is he doing—he is exporting fifty per cent of pulp and fifty per cent of water. We do not want to export water. I am one of those Canadians who believe in exporting not pulp, not water, but paper. Until the time comes—and it is rapidly coming, there is no question about that, when Canada will be the paper manufacturing country of the world—let us use our resources to the best advantage and save our raw material as well as we can. Give Canadians a chance. The lumbermen of Canada have made great advances in the development of their establishments. But the building of a pulp and paper mill means a very large capital outlay. There are not many individual men who can spend \$2,000,000, in addition to their present expenditure in pulp and paper mills. Pulp mills alone are no good to Canada. You can count on your fingers the pulp mills that we ought to have in existence. The true system is to have pulp and paper mills and export only the paper. Now, the statement is made that the exportation of the little provincial pulp wood that we send out is going to be a serious detriment to Canada. I do not share that opinion. Let the few people who want to export the trifle of pulp wood that they are now sending out continue to do so. Do not trammel them. Let the few men who are not thoroughbred Canadians stand aside; let those Canadians who are worthy the name step forward and say that they want no restrictions on trade. We have the best water powers in the world; we have the best pulp wood forest in the world, we have as good men as there are in the world. Why, then, should we fear the competition of any? If we are to succeed in developing this great industry, let us succeed as men; let our own activity, our own skill, be that which shall bring about our success, and not restrictions on trade that, while working to our advantage, will be injurious to others.

MR. JAS. BEVERIDGE,

General Manager of the Mirimachi Pulp and Paper Co., Limited.

I am rather disappointed with the way in which Senator Edwards and others have referred to the wood-pulp industry, and in reply to that gentleman what I have to say, I will say briefly and perhaps to the point. We pulp makers are blamed for many things we don't do, chiefly that of destroying the forests. Now I operate a large sulphite fibre business in New Brunswick, and the size of lumber I use will average from 9 to 10 inches. We take logs measuring not less than 6 inches at the top, and it must be remembered we take the whole tree to convert into fibre, whilst the lumberman or logsawyer does not. I consider the sulphite pulp maker a much more important citizen in the state than the average log Sawyer for the following reason: I think you will allow, Mr. Chairman, that the importance of any industry to a state or commonwealth depends upon the amount of

money which that industry pays for labour, or the wage-earning class. In making a comparison between what the log sawyer and pulp maker does in this respect, I am afraid I shall be a little personal. Both Senator Edwards and myself bring out logs from the forest, and it costs each of us substantially the same per M. feet. That cost I will put down at \$5. Having thus got logs in our respective booms, the log sawyer spends no more than \$2 more in sawing this quantity into merchantable lumber. But what does the sulphite fibre maker spend? He spends \$6.50 to \$7 for labour in converting the 1,000 feet into fibre. Or, on the one hand, the log sawyer pays a total of \$7 for labour, whilst on the other the sulphite fibre maker pays \$12 for every 1,000 feet brought out of the forest. The difference between the two parties is \$5, and I claim that the pulp maker is five-twelfths a better citizen than the log sawyer, and that the sulphite fibre maker is the more important manufacturer to the state. Now, let me go a step further. If you, Mr. Chairman, as manager of the state found that one of your departments did not pay, you would cut it off, would you not? (Sir Wilfrid nodded acquiescence). Then I hold you ought to shut down Senator Edward's mill and hand his lumber over to me to convert into pulp. That, gentlemen, is perhaps the ludicrous side of my argument.

As a matter of fact the sulphite pulp-maker is a very important individual to the state. No man could build the factory I control and give me the business facilities I have under an expenditure of \$750,000. We pay \$160,000 in wages a year, consume a large quantity of coal and limestone, both of which we obtain in the Dominion, and last month (December) we gave over 6,000 tons of freight to the Intercolonial Railway. And all this is on fourteen million superficial feet of logs brought out of the forest. This is a very large business, and is it too much to ask Senator Edwards if he can show such a record? Or does he think men who carry on such a business are a body of manufacturers to be despised? I think not. I consider we form the backbone of the state.

Let me give another view of the case. I understand Senator Edwards cuts between fifty and sixty million feet a year.

A VOICE.—A hundred million.

MR. BEVERIDGE.—Did Senator Edwards say a hundred million?

HON. MR. EDWARDS.—We are not telling to-day.

MR. BEVERIDGE.—Well if that is so, I will assume the amount and make a statement which I venture to think Senator Edwards will not contradict. I could run my factory for 18 months or 2 years with the waste material which this gentleman makes alone from his season's cut, and which he burns to get rid of. Now I ask who destroys the forests, or who wastes the product of the forests?

HON. MR. EDWARDS.—The man who cuts the small lumber.

MR. BEVERIDGE.—That is not so. Senator Edwards himself has raised this question, and has himself taken the trouble to bring photographs to show the growth of pine in 34 years in Quebec. In Germany they can grow 3,960 trees on an acre in from 20 to 25 years, and I consider it possible, given soil and other conditions, to do the same in Canada. With a government grant of 23,000 acres I would undertake to cultivate all the trees necessary to run my factory representing a capital in plant and

machinery of \$750,000, and pay wages to the state to the amount of about \$175,000 a year.

Now I do not wish to take up more time, having said enough, I think, to stop lumbermen in future slanging the pulp manufacturers. After all we pulp makers are very good citizens.

AFTERNOON SESSION.

FRIDAY, January 12, 1906.

FORESTRY EDUCATION.

Mgr. J. U. K. Laflamme, University of Laval.

Having to speak about forestry education, I will keep myself within limits as narrow as possible, and touch only the general notions which every one should have, the uneducated as well as the educated people.

To the 'Canadian Forestry Association' belongs the honour of having first brought about a serious consideration of scientific and economic forestry in Canada. From the first moment of its existence, its zeal has never lessened, and at present its influence has reached even the highest spheres of the official power. The proof of this lies in the fact that the present reunion has been called by Right Hon. Sir Wilfrid Laurier, Prime Minister of Canada. 'Canada,' he says in his splendid letter to the public 'possesses virgin forests which in extent yield to no other country in the world, and European experts think that her woods will enable her, in the future, to rank first among the great wood suppliers of the world.' It is to study these resources and, at the same time, the perpetuation of them, that we see gathered here to-day the representatives of our industry, of our ruling classes, of the universities and colleges; in a word, all those who, for any reason, are interested in the question of forestry.

I am very glad to say, first of all, that the forestry question has already interested in a large degree some of our local governments. Ontario took the lead in establishing, inasmuch as circumstances permitted, a forestry service, well organized indeed, and highly appreciated by all those who know it; and it is a pleasure for me to add that Quebec has also taken an active part in this movement.

Last autumn, in response to the wise suggestion of Hon. A. Turgeon, Minister of Crown Lands, our government sent two young French-Canadians to the Yale Forestry School. When they have obtained their diplomas, these young men will go abroad to study on the spot the forestry methods as used in France, Germany, Sweden, &c., and on their return they will be, not only competent judges on all forestry matters, but moreover the pioneers in the teaching of forestry. With time, and very soon, we will have a well organized and complete provincial forestry school, attending firstly to our own local forestry problems, which differ more or less from those of any other country.



STANLEY PARK, VANCOUVER, B.C.

We ought, therefore, to praise heartily this wise and far-seeing measure of our local government. For many years we have awaited it, desired it, and the honour of having decreed it will fall to our present ministers. From these facts we may conclude that the opinion of our rulers, either at Ottawa or in the provinces, is won over to the great cause of our forests.

But we should go further, and develop this same turn of mind among all our fellow citizens, educated or not. We should reach the people as a whole, in order to bring home to every one of them sane ideas and to interest them in the forestry question. After that has been done, our rulers, being always sure of the approval of public opinion, could act more energetically and more quickly, without being troubled by the meddling of the ignorant or interested parties.

How shall we reach this end, and teach our people the rudiments of silviculture? Will it be, for instance, by introducing some knowledge of forestry in the curriculum of our elementary schools, and by forcing the little Canadians to discuss economical questions of forestry? To this question I answer emphatically, no. Let the teaching in these schools consist of reading, writing, counting, a little of local history and geography and the principles of religion, and it will cover all that can be reasonably expected. At the most, I would advise that the teacher, from time to time, during little outings in the neighbouring woods, should give to his pupils sound and general data on forestry matters; what has been called, *Leçons de choses*. Any more than this would be out of the way and would lead to a piteous failure.

In the high schools and academies, normal schools and colleges, I would go a step farther. It is there, indeed, that the teachers are made; it is from there that come those who will constitute the ruling classes. Consequently it is only right that these students should know well the importance of the forestry question. Therefore I would advise some kind of forestry training, but on the express condition that it be organized with much tact and judgment; for our aim cannot be to make professional foresters out of those pupils, but rather to teach them general principles, so that, when leaving the college, they carry home with them the conviction that we Canadians have a forestry question to be solved, and that if we wish to solve it without compromising the future, we should look for this solution to come from competent persons following closely scientific data and principles.

It is again along these lines that I would like to see the clergy, the professional men, the manufacturers, the lumbermen, contribute to spread sound ideas in forestry matters among the people with whom they live. This personal action would require very little effort, and could often be realized simply by a good advice, given in due time, or a simple remark made *en passant*.

This is one way of understanding the manner in which we should get a popular and practical forestry education; but there is another means which cannot be neglected: it is reading newspapers, reviews, books, &c.

The people read more than ever; therefore let us distribute, on all sides, tracts concerning our forests—but on one condition, that these papers be well done. In preparing them, the authors will leave out all pretention to exhibit a great science, and adopt, as much as possible, the *point de vue* and talking of their future readers. Moreover, they should treat only essentially practical points.

In the United States the Federal government sends free of charge, at the request of interested parties, expert foresters who furnish all the information wanted on the manner of treating wood lots, according to the use which the proprietor wishes to make of them. Why should not our governments do likewise? Why should we not have something to say to the proprietors about the general and particular care of their forests? For instance, why should not the colonist be advised never to lay bare the surface of steep slopes, whether for fear of disastrous landslides or of denuding what the centuries to come might be unable to recover with a valuable crop of wood? Why should they not be cautioned particularly and forcibly against the dangers of forest fires, and made to understand the *à propos* of the official regulations which relate to them? Why should it not be emphasized to them that the colonist is wrong when he persists in tilling a barren and gritty land? Why should he not be made to understand that this poor land, from which a few passable harvests may possibly be reaped as long as its humus and the ashes have not been exhausted, will soon be unable to repay the toil which would have to be expended upon it; that he better choose another lot of good, deep soil, and leave the poor one covered up with its perpetual meadow of valuable timber.

These are some of the points which I should like to see treated in popular tracts, to be distributed everywhere among the population of farmers and colonists. I do not mean, as I said before, complete didactic dissertations; God forbid! The people could not read them. A few pages would suffice, provided they be stirring, impregnated with the good common sense which appeals to every one and always produces its effect.

All these publications should be written in French and English. When the forest is at stake, the province of Quebec plays a very important part, and, whether we will it or not, the English papers would not now and will never be properly understood by the French population of Quebec farmers; no more, I suppose, than the French publications would now or ever will be understood by the English speaking farmers of Ontario. I am glad to mention in connection with that that Hon. A. Turgeon has ordered to prepare in French an opusculé on the general principles of the science of forestry, which is to be distributed throughout the province of Quebec. For the same purpose I would like our association to publish in the two official languages of the Dominion, and by thousands, all its reports, in order that a large number of readers may profit by them.

At the risk of abusing your patience, I shall indicate another way of instructing the people on forestry matters: I mean the example. Here, I speak especially of the enlightened class. They should take great care of their forests, if they have any, and even try plantations, if they can afford it. However, it can be said that these plantations are hardly practicable in our Quebec province. We must, first of all, preserve what we have, improve it if possible, and then our duty will have been fulfilled. Nevertheless there are instances when planting may be the only means of utilizing certain bare surfaces or of preventing real calamities. On this very point, the last number of the *Canadian Forestry Journal*, from a report of Dr. J. Fletcher, gives an interesting account of attempts made on the sandy hills of Argenteuil, near Lachute. These experiments date back from 1898 and before, and the owners of these hills are already quite satisfied with the results obtained.

Besides this example of Lachute, here is another probably more conclusive.

The priests of St. Sulpice are the owners of large properties at Oka, on the Lac-des-deux-Montagnes. Near the Indian village were vast surfaces of quicksand completely arid. These sandy hills were a growing menace to the neighbourhood. The sand was invading very rapidly under the double impulse of the summer winds and the rush of water in the spring. The village was in danger, and it became urgent to take means of saving it from the threatening invasion.

M. l'abbé J. D. Lefebvre, curé of Oka, took the matter in hand. He is nothing of a professional forester; however, under the circumstances he proved himself to be one, and a good one too. With the permission of his superiors, he undertook to plant trees on these moving sands. I cite here the proper words in which he explained to me what he did:—

‘The trees planted are pines, white spruces, cedars and hemlocks. The majority are pines and spruces. The reason for this is that the saplings of these trees are more common. Out of the 66,000 trees planted, about 8,000 have perished. I replaced them later on. The trees which are the most exposed to the wind do not grow so well as the others; and, in order to shelter them from the winds I have planted them in groups; the others were planted in rows.

To fix the sand, I had sown about 100 bags of poor grain which the farmers gave me after the sifting; then I had spread chaff of oats, barley, buckwheat, etc., to cover the ground. The success of the plants appeared to me to be assured after one year. The little trees were planted at a distance of only three feet apart, to prevent the sand from piling up. It seems to me that the distance ought to be from ten to twelve feet in a soil where there would not be the inconvenience of sand. Later, it will be necessary to space them by removing one of every three. The size of the plants was on the average about three feet. Their present dimension is from twelve to twenty feet. The planting was done in October and November of 1886, 1887 and 1888, and a few thousand more in 1895 to replace those which had perished. This time of the year was chosen in order that the young plants might have more moisture; the autumn rains and afterwards the melting of the snow. I thought that these little trees would be already strong enough and better protected against the great heat of the summer and the effect of the sun on the burning sand.

The total cost of these plantations was about two thousand dollars. I did not buy the plants as we could get them a few acres from the place of planting. Later, I had some trimming done, the work costing about four hundred and fifty dollars. Forty-eight acres were covered by these plantations.’

This is what the Sulpicians did at Oka. Perhaps the official foresters will find in these notes some details to criticise from a technical point of view. But this would not make the result any way different. The sand dunes of Oka are fixed, and the now growing forest, perhaps still a little crowded, will be worth much more in a few years than was laid out upon it.

While listening last fall to the account which my excellent friend was giving me of his experience in planting, I asked him if it would not be *à propos* to try the same experiment on some of our arid farms, which give no crops whatever and upon which one can see the sand drifting in summer like the snow in winter. Such a work is not

beyond the means of an enterprising government. And at the end of fifty or eighty years, these lands would represent a value much greater than the initial expense, even if we take into account a reasonable interest on the capital.

Should we conclude from this that replanting has to be greatly encouraged in the province of Quebec? I do not think so. Let the government, some wealthy communities and even private companies try these experiments, it is all very well. But that private individuals try the same thing without very special reasons, for the sole purpose of acquiring a forest for exploitation, we are of opinion would be a very hazardous enterprise.

As a general conclusion to be drawn from these too long considerations, we can say that it is of the utmost interest for all Canadians to acquire sound ideas of the forests, of their value, of the part they play in the general economy of public wealth, and, consequently, of the jealous care with which it is expedient to preserve and improve them. All this I should call, a national forestry education.

We are already on the right path; we have done something, but there is still much more to be done. One duty is to hasten now and not wait until our forests have been destroyed or seriously harmed. It is far better to spend now judiciously a few thousand dollars each year, in order to save our capital, than to be obliged to spend a few more later, if it became a necessity of repairing losses, sometimes irreparable.

France and Germany would not be obliged to spend millions in reforesting their mountains and dunes if they had preserved the forests which sheltered them in former years, and which a short-sighted policy, coupled with favouritism, allowed to be destroyed at the end of the eighteenth century.

We should have well equipped technical schools; but at the same time we must awake the public spirit. This will prove a powerful lever to help us to attain surely the end towards which we are all aiming, the preservation and increase in value of our forests, this all-important national wealth.

CANADIAN FOREST POLICY.

DR. JUDSON F. CLARK, FORESTER FOR THE PROVINCE OF ONTARIO.

When an individual or a nation is urged to undertake any new enterprise the advocate must be prepared to show that it is not only practicable and desirable, but that it is a business proposition, or in other words, that it will pay. That there are sentimental considerations urging better care of the forests is undeniable. That they should have weight is equally indisputable. But forestry is absolutely independent of such, its appeal to-day is as a business proposition to business men, and more especially as a business proposition to statesmen, for the whole history of forests and forestry from the time of ancient Babylon to the present has been a demonstration of the fact that the state is the best, if not the only good forester.

Personally, I think it is beyond doubt that the development of a rational, and therefore practical and business-like, forest policy by the Canadian provinces and the federal government will have a greater influence on the prosperity and happiness of our country half a century hence than the solution of any other problem which is within the power of our generation to solve.

There are at least three reasons of paramount importance why Canadian forests should be managed with a view to the production of wood crops in perpetuity. These reasons have already been repeatedly discussed at the different sessions of the convention. Permit me to repeat them briefly by way of emphasis and as a foundation on which to base some recommendations for a national forest policy.

FOR THE PERMANENCE OF LUMBERING INDUSTRIES.

1. The necessity of a permanent supply of logs for the maintenance of our great and growing lumbering and other woodworking industries.

The products of these industries are absolutely essential for the future of our production, our transportation, and our manufactures. Aside, indeed, from the character of its people there is nothing which contributes so greatly to the prosperity and happiness of a people than an abundant supply of wood at reasonable prices. Wood forms the very corner-stone of modern industrial life, and as years go by modern civilized man demands and uses more and more wood, all substitution by iron, steel, cement, &c., to the contrary notwithstanding.

There are some who are better acquainted with the forests than the markets, and others who are acquainted with neither forests nor markets, who still believe and speak of Canada's 'inexhaustible' forests. Take any man through a 400,000-acre lot of fine forest so thoroughly that he will have seen all the trees, and it is most likely that he will be ready to believe in inexhaustible forests. Tell him then that all the trees that he has seen would hardly supply the needs of the railways of North America for cross-ties for a single year, and his 'inexhaustible' will appear as futile as it is. We have great but diminishing forests and great and ever growing needs for forest products.

FOR THE CONSERVATION OF STREAM FLOW.

2. Second only in importance to the function of the forest as a producer of wood is its function as a regulator of the flow of streams.

Canada's wealth in her water-powers is very large. Some one has estimated that two-fifths of the water-powers of the world are found on Canadian soil. Whether this be correct or not there is no doubt but that the water-powers of Canada vastly excel those of any other nation. What this will mean for her industrial future it is impossible to forecast, perhaps impossible to exaggerate. Add to this the value of the streams for irrigation, domestic use, and navigation, and who would dare guess how many figures would be required to express the value of Canada's streams a century or even half a century hence if maintained in their present efficiency?

If the forest lands of Canada be placed under a rational forest management, the present efficiency, by which I mean of course the regularity of her stream flow, may not be maintained only, but much increased. Present methods of lumbering, with their accompaniment of fire on the lumbered lands are annually and to a large extent permanently, subtracting from the value of this great national asset.

FOR PUBLIC REVENUE.

3. A third reason for conducting lumbering operations on non-agricultural lands, with a view to improving and perpetuating the forests is found in the fact that it is

only by maintaining such lands under forest crops that they may be made to permanently contribute to the wealth of the provinces of the nation. Compared acre for acre with arable lands, these rough lands have a low producing capacity. The vastness of the area involved, however, places the non-agricultural lands of Canada in the front rank of her natural resources.

Not only is it a great national duty born of necessity—the necessity of the future—that Canada care for her forests, but it will inevitably prove a highly remunerative business proposition.

FOREST SITUATION IN NORTH AMERICA.

North America to-day cuts three-fifths and consumes more than one-half of the total lumber production of the whole world. This prodigious consumption is very rapidly increasing both on account of an increase in the per capita consumption and the consuming population. There can be no manner of doubt but that the present annual cut, together with that destroyed by fire, vastly exceeds the net annual production by growth. In other words a wood famine in North America is already in sight. I was asked the other day when it was due to strike. I replied that as near as I could interpret the signs of the times, the year 1900 would be about right, and that the pressure of prices was likely to become increasingly burdensome from decade to decade until the famine would be unanimously admitted. I understand that many purchasers of lumber are already admitting it.

CANADA'S ADVANTAGEOUS POSITION.

The Canadian forests, which form beyond question the world's greatest remaining reserve of coniferous timber, form a band across the continent from the Atlantic to the Pacific bordering the richest farming and manufacturing area in the whole world. The population of the consuming area tributary to our forests has increased four-fold during the last half century, but its wood consumption has increased ten-fold. This marvellous increase in the use of forest products has already established stumpage prices which put national wood culture on a satisfactory financial basis from the standpoint of revenue alone. It should not be forgotten that the rise in prices which makes forestry a business proposition has come about in the face of an exploitation of the forests on both private and public lands such as was never seen elsewhere in the history of lumbering and cannot be again repeated in North America nor on any other continent.

The territory tributary to our Canadian forests which increased its wood consumption ten-fold during the past half century is to a very large extent merely on the threshold of its industrial development. Nothing is more certain than that the present demand for the products of our forests will be indefinitely maintained—nothing more probable than that it will be greatly increased.

In view, then, of the desirability of caring for the forests as a sound business proposition from the standpoint of direct financial returns and its necessity from the standpoint of wood production and water conservation, I submit that no time could be more opportune than the present for the inauguration of a national forest policy having for its object the conservation of the forests by wise use.

FOREST PROTECTION.

In this forestry policy first place must, of course, be given to forest protection, and more particularly to the prevention of forest fires, for without reasonable safety in this regard there can be no forest management. Considerable progress has already been made by several provinces in this matter, but everywhere much remains to be done. Further progress is needed along three lines, namely,

Improved fire laws,

More efficient administration of the fire laws, and the

Disposal of debris incident to lumbering operations.

Nova Scotia has at present the best fire law, though it is in some respects surpassed by that of New Brunswick, and Ontario the most efficient administration.

PRACTICABILITY OF DISPOSING OF DEBRIS.

In the report of the Ontario Bureau of Forestry, for 1904, I have discussed in detail the practicability of burning the debris incident to lumbering operations in pineries. I shall only repeat here that it has been demonstrated that a good clean job of brush burning may be done on pine lands at a cost varying according to local circumstances of from 12 to 25 cents per M. feet, board measure, of the timber cut. Whether a similar burning of the brush on spruce lands be also practicable has not yet been demonstrated by any fair test on a commercial scale. I submit, however, that the making of such a test is one of the most urgent duties of the provinces selling pulp wood stumpage. It will pay any province vastly better to take ten or fifteen cents less per cord for its pulp wood and secure the safety and the advantage to reproduction which goes with the burning of the debris than to secure the utmost present cash return and leave the areas cut over for pulp wood in the deplorable and menacing condition which is to-day characteristic of Canadian pulp wood slashings.

It need scarcely be added that the state rather than the lumberman should in all cases bear the expense of such safety measures, for it is in the interest of the future citizens of the state that they are undertaken.

WOODLAND TAXATION.

Forest taxation is, next to fire protection, the most important consideration in planning forest management on privately owned lands. Governments have in their control of the method and amount of taxation a powerful lever to foster or destroy the practice of forestry by private owners. Under normal conditions no woodland owner can be exempted from a fair and equitable share in the burden of government. Where, however, the tendency to deforest reaches the point where the general interests of a community are endangered, the partial or complete exemption from taxation of such woodlands as are devoted exclusively to forest purposes and come up to a reasonable standard of production may be resorted to as a remedial measure; or the taxation may be shifted from an annual tax on the land to a stumpage tax on the annual cut, thus converting the tax itself into a measure of restraint as regards deforestation.

CLASSIFICATION OF PUBLIC LANDS.

An important feature of a Canadian forest policy must be the exploration and classification of the public lands. Such lands as contain a satisfactory proportion of good plough lands and are reasonably accessible to markets should be opened for settlement as the land is required for agricultural development. Townships or larger areas in which the non-agricultural lands predominate should, under no circumstances, be opened for settlement, but should be constituted provincial or federal forest reserves, and be devoted to timber production in perpetuity.

Just what proportion of plough land contained should entitle a township or district to be classed as suitable for agricultural settlement is open to debate. In deciding this point it should be kept clearly in mind that a mistake in choosing too high a standard for the agricultural lands may be subsequently remedied at any time without embarrassment or loss, while the mistake of opening up for settlement lands unsuited for agriculture is certain to be a great and lasting injury to both settler and province, and is well nigh irremediable as witness many townships in Muskoka, Haliburton, and elsewhere.

MUNICIPAL FOREST RESERVES.

A second class of forest reserves which the provinces would do well to foster is what may be termed municipal forest reserves.

There are many townships having within their boundaries considerable areas of waste lands which after trial have been abandoned as unsuitable for growing field crops. The only hope of restoring such lands to useful production is by reforestation, and there are many good reasons that may be urged for the undertaking of the enterprise by the local municipality.

It would be good policy for the provinces to assist such municipalities as are willing to establish municipal forest reserves by advancing the money for the purchase of the lands, and by organizing an efficient forest service for their management. In the course of time, varying from 15 years in the more southern parts to 30 or 35 years in northern districts, the townships would be in receipt of a steady and very considerable income from their municipal forests for the easement of local taxation. There are many municipalities in Europe having no higher prices for forests products than in Western Ontario to-day whose income from such municipal forests pays the entire expense of maintaining schools, roads, and other local improvements, and in not a few cases there is a surplus which is annually divided as a cash bonus among the citizens.

Such a system of municipal forest reserves could with the utmost advantage be extended to the newer districts where townships are being opened for settlement. All that would be necessary would in this case be to select and reserve from location at the time of the survey, a suitable area in the part of the township least adapted for agriculture. Such reserves being already stocked with merchantable timber would be capable of yielding a revenue to the municipality from the first.

PRACTICAL FOREST MANAGEMENT.

The central feature of a forest policy and that which gives real worth to all the rest is of course the introduction of a system of practical forest management, having for its aim the perpetuation and improvement of the forest by judicious lumbering.

Canadian forest management will naturally differ widely from European forest management, for our forests, our transportation, our markets, and our people all differ widely. It will also differ somewhat from the forestry of our neighbours to the south, for there are characteristic Canadian conditions to be met—not the least of which is the radical difference in forest ownership and the relations existing between the lumbermen and the state. Canadian foresters may of course learn much from the foresters of Europe and will doubtless learn much more from those of the United States, where many of the conditions are very similar, but in the end they must work out their own salvation by the development of a system of Canadian forest management designed especially to meet Canadian forest conditions.

STOCK-TAKING OF TIMBER RESOURCES.

As a first step in this direction it will be the duty of the provinces to undertake a systematic stock-taking of their timber resources, for without a knowledge as to what they have in the way of standing timber, any attempt at forest management must be blind and ineffective. This stock-taking will naturally include the kind, quantity, quality, state of maturity, rate of growth, and location of the standing timber; the character of the soil and its adaptability for growing particular kinds of timber; and a more or less complete topographic survey having special reference to the drainage, character of the surface and such other reference to the drainage, character of the surface and such other features as would be of importance in planning logging operations.

Knowing, then *what* there is and *where* it is and how it may be gotten out, the next step will be to limit logging operations as much as may be practicable to districts where the stands are mature or overmature. The mature timber must be sold under such conditions as will conserve alike the interests of the lumberman and those of the province. The price paid for the logs must be made with the clear understanding that they are to be removed under such rules and regulations as will insure the reproduction and future safety of the forest. These rules and regulations must naturally be prepared and published in advance of the sale, that the purchaser may know definitely at the time of the sale the conditions under which he is to conduct the logging operations.

THE LUMBERMAN AND FORESTRY.

Lumbermen are more interested in the perpetuation of the forests than any other class of citizens, and in any square deal will be found willing to do their share to that end. It is high time, however, that the Canadian provinces ceased to sell the public timber under a system which makes it in the present financial interest of the logger to despoil the forest. Were the stumpage sold in a proper and business-like way there would be no need to implore the lumberman to think of the nation's posterity rather than his own, a plea which must always be futile, besides it is perfectly practicable to conserve and harmonize the interests of the lumberman and the public, present and future.

TRAINED FORESTERS NECESSARY.

Systematic care of forests implies of course a trained forest service.

There was a time when the doctor's office, the court room, and the deck of a ship were the only places of training for the physician, the lawyer, and the naval officer,

just as to-day the lumber camp is the only place of training for those who at present direct the cutting of the Canadian forests. But the world has made progress in educational matters in the last fifty years, and to-day we have, established and maintained by the state, military and naval academies, schools of law and medicine, of mining, engineering, agriculture, and other professional and technical schools too numerous to mention.

With her vast interests in forests and forest products there can, I think, be little doubt but that the time has fully come for the establishment of a Canadian School of Forestry for the training of her coming forest service.

A PRACTICAL FORESTRY TRAINING.

Time does not permit me to discuss in any detail the character of the instruction which should be given at such a school. In very brief, I would say that a broad elementary training in the so-called natural sciences and mathematics is a most necessary preparation for the forester's professional training. That the professional training must be as practical as possible goes of course without saying. To this end all theoretical instruction must be supplemented by practical investigation and application in the woods. I would go farther and recommend that on the completion of their school work—theoretical and practical—all students who have not previously had a practical training in the lumbering business be required to associate themselves with a lumber firm for a year for the purpose of studying and practically assisting in the various operations from the felling of the trees to the grading of the lumber for the market. This training will prove of value to students not alone in the matter of information gained, but will serve the useful purpose of bringing the foresters and the lumbermen in touch personally and professionally.

ASSISTANCE FOR PRIVATE OWNERS.

The educational side of a national forest policy would be incomplete without provision for the dissemination of a knowledge of improved methods of woodland management for the benefit of the private owners, who control in the aggregate many million acres of woodlands, which scattered as they are throughout the agricultural sections, are acre for acre the most valuable of Canadian forest lands. The Ontario Department of Agriculture and the Dominion Forestry Branch have already made an excellent beginning in this great educational work.

Such in brief is a glimpse of Canada's responsibility, opportunity and duty. As we accept our responsibilities and as we do our duty according to our opportunity will we be judged by future generations as having been worthy or unworthy custodians of an almost unbounded natural resource.

MR. B. E. WALKER,

GENERAL MANAGER OF THE BANK OF COMMERCE.

I hardly have the courage to face this convention after listening to the addresses which have been presented during the last three days, though I had indulged the hope that I might say a few things which had not been said before, or present them in a new shape. My hope of doing so nearly vanished while Dr. Judson Clark was making his very excellent remarks. I am not an expert in forestry—I am merely a business man—but in common with many other Canadians I have thought over our alarming forestry conditions for many years past. We have had a state of affairs which is not uncommon when experts, men of scientific training, have for some years been trying to impress their views upon practical people. We have had commissions of forestry, we have had meetings and we have found that the practical men and the scientific experts have apparently not come together. This convention, for which we shall always have to thank our premier, and which may be looked upon in future as one of the great historical facts in connection with our industrial development, is about to conclude, but we will not take our departure with the feeling that the addresses which have been presented here were barren and useless, but with the feeling that practical results must follow. Now, with other gentlemen who have attended this convention more continuously than I have, I am impressed by the almost extraordinary agreement of opinion on the matter among those who are experts, and also by the fact that we appear to have managed to gather into this convention all the leading experts on forestry in America; and I know from the nature of the training of many of these gentlemen that we have probably had presented to us all that is known on the scientific side of forestry throughout the world. That alone might have no great practical effect at the present time; it might be only one or two more of the drops which must fall by the thousand before they have any practical effect; but we have had curious evidence that our legislators, the policy-makers of the people, who are apt to take a practical view of things and who are sometimes prejudiced against experts, are in accord with the experts themselves. I think we may say that we have reached the psychological moment in the history and development of this movement when there are no doubters or dissenters, and I believe that all the people gathered here will go away with the impression that we have had before us data of the highest importance that could be presented to the people of Canada. These facts have been presented here with much less waste of words than usually characterizes such an occasion, and in addresses that have been not only curiously instructive but eloquent; so eloquent, in fact, that one wonders if forestry has anything to do with eloquence. I am sure we will all go away feeling that this convention has been guided by what Matthew Arnold would call 'high seriousness.'

I think this is a matter of tremendous importance, because, as has been said over and over again, it is an educational matter. We have a great many different sections of the community to educate. We have to educate the politicians themselves. Even when the politicians have been imbued with the truth of a subject, even when every legislator in Canada is impressed with the necessity of action, there is something still further required; these gentlemen must in the nature of things wish to be sure that they have the sentiment of the people behind them. That is what this convention has

met for, and I am sure the press will do their part to disseminate throughout Canada the truths that have been so clearly stated. One of the journalists said to me to-day, that from what he has learned here he could write an article every day for the next year on forestry. I only hope he will do so, because it is only by the persistent reiteration of facts of this kind that we can hope to impress the people of Canada with the fact that the things called crimes in this convention are really crimes. It is so easy to call a thing a national crime, and it is so difficult to convince people that it is a national crime, and that disaster is absolutely certain unless precautionary measures are taken.

I myself only wish to say a few words on two aspects of the matter. First, in regard to education; I think we must all feel a realizing sense of the debt we owe to Mgr. Laflamme for his delightful paper. He represents, perhaps, the best and the highest spirit of education in the province of Quebec. There is no province in Canada that is so deeply interested in forestry as Quebec. Can we hope that Mgr. Laflamme will inspire his co-educationists in Quebec, or will so strengthen them by his words, that they will be able to convince the people of Quebec as to what is necessary in regard to forestry? As a citizen of Ontario, perhaps I should not speak on this subject, but I feel that if the Abbe could speak to his own people as eloquently as he has done here to-day he could take care of the forestry question alone as far as Quebec is concerned. We had also a remarkable paper from another member of the church—Father Burke, of Prince Edward Island—whose knowledge of the subject, I must say, made us quite ashamed of ourselves. We business men, we practical men, we who think we know something about the subject, after listening to two addresses by members of a profession which is not supposed to concern itself very much with industry, must at least feel ashamed to realize how very much less we have gone into the subject than they have.

We have shown in the province of Ontario that we can carry on schools of agriculture and dairying and things of that kind, that we can carry them on in a practical way and that we have left behind the day when the finger of derision can be pointed at them even by politicians. In a school of this kind we are now teaching that part of forestry which relates to the farm, but that school, it seems to me, is not the place where forestry in its provincial or educational aspect should be taught. I am a member of the Royal Commission in connection with the University of Toronto which is sitting at the present time, and as we have not yet come to any conclusion it would perhaps be improper for me to say what we should do, but I, personally, am not afraid to say that I am sure we shall recommend the establishment of a chair of forestry; and my own feeling is that, while forestry, associated as it properly is with land surveying, may at first be a part of the Faculty of the School of Science, we shall soon see in the University of Toronto a faculty of forestry by itself.

I should be very hardy if I ventured to discuss what the teaching of forestry should be. I know that the experts themselves do not entirely agree on that subject. I can see that between a gentleman like Senator Edwards and some of the experts, there is a difference of opinion as to how far education should be practical and how far it should be scientific and at the same time what they call eminently practical. We must decide as to this for ourselves. We have learned from small beginnings how to conduct a school of agriculture, and we have now a great enduring and prosperous

institution. We are likewise going to make forestry a practical question. We must simply begin like other people and learn how to make it absolutely subservient to the varied interests of this country—the commercial interests, the lumbering interests and the national interests—saving our water-powers and at the same time keeping in mind the esthetic aspect of the question; because, if we make a beautiful country for man to live in, they will wish to live in it. The man who thinks that the esthetic side of forestry has nothing to do with the practical upbuilding of the nation is simply a species of fool. That is all there is in it.

A great deal has been said with regard to the segregation of forest areas, but very little as to how that is to be accomplished. I cannot offer any final opinion on the subject, but I have for years been deeply interested in the matter and I have never agreed with the manner in which our surveys are carried on. I would like to see here such a survey as that which has been made in the western states of the United States. It is not called a geological survey or a topographical survey; I think, merely a survey. It seeks to ascertain what the conditions are; of course looking over the topography with the object of providing reasonably correct maps—our maps are shockingly inaccurate—and then it begins to describe, not a section of the earth's crust, but the surface of the earth itself; and it tells about the forests, how they should be preserved, and about the soils, distinguishing those which are suitable for agriculture from those which are not. This is a survey which is sometimes called a physiographical survey. I think that such a survey, undertaken by the Geological Survey, would admirably serve our purpose. It occurs to me that when we are talking about setting aside areas which are to be held as forest land, we are not giving much consideration as to how that is to be done. I suppose we could immediately and with great safety set aside large areas; but we will find great quantities of land left out; owing no doubt to dispute as to what is eventually to be done with it. Some of that land will already be in the possession of private owners. There is no reason why, even if it is in the hands of private owners, the federal government should not take the responsibility of declaring what parts of the country should be forest and what parts available for agriculture. The effect of this would be that we could purchase at any time certain lands which should never have been given over to agriculture but which should have been claimed as timber and forest areas. However, I am not courageous enough to say that this would be a solution of the great difficulty which was presented by the Minister from Quebec. It is all very well for the lumbermen to say that great areas should be set aside for forests and that the settler should go somewhere else. That is a very easy thing to say, but it is perfectly certain that we are just as much interested in finding out which part of eastern Canada is suitable for settlement as we are in finding out what part is suitable for forest area. And how are we to have the knowledge which shall be final unless some one undertakes the responsibility of mapping out these areas and of declaring in a more or less definite way which are suitable for one purpose and which for the other. Is that not absolutely the business of a survey? I have had occasion to say before that if a private individual owned 100,000 acres of land there is no doubt but that he would know where the forest was and what the fair value of it was. He would ascertain what he had. He would take stock. The thing we, as a nation, do not do is to take stock. We allow private individuals to take stock, come to the government and buy up limits, mines or any other kind of natural asset, and they, having greater know-

ledge than the government, can get possession of the nation's property for less than they should pay for it. There is only one cure for this, and that is for the national government to have a survey made, to take stock for the people and tell them what they have. In this matter of forestry the thing we want most now is to have the areas of the country delimited later, so that the federal government may say: This part shall be for forest area, that part for settlement.—And then let the provinces hold as nearly as possible to these lines.

I do not know whether this can be regarded as a practical suggestion. I am not a practical man, but I have been deeply impressed with the fact that it is in the power of the federal government to enable us to know things about the national domain which the people must know before they can legislate intelligently. Personally, I do not think we spend anything like enough money on surveys. If we spent four times as much and got good value for it, it would be better.

A great deal has been said about the natural monopoly which Canada may be said to possess—if any monopoly may be called natural. We feel that we have a monopoly in our water powers and timber supplies, but these monopolies would not be of such great value if we did not have in addition to them other natural resources which may not be in the nature of monopolies, but which help to make our future as clear as it is. We have vast supplies of coal, and in other parts of the country where we have no coal, we have vast supplies of other means of producing energy such as water powers; we have vast quantities of cement which will some day, perhaps, be as useful as lumber; and we have iron and every other species of mineral. We know beyond a doubt that if we do our duty we shall be one of the greatest manufacturing countries in the world. I think it is not a silly boast to say that somewhere in the future we may be the greatest manufacturing country in the world. But, there is no doubt that if we disturb the beautiful balance that nature has given us in our natural resources the entire order of things in Canada may fall to pieces. It is not simply that our water powers will decline in value, but our coal areas will not be so valuable. Nothing will be so valuable. Nature has given us a curious opportunity for the strong northern man to exercise his brains upon, and if we disturb the equilibrium we are criminals in the greatest sense in which men can be criminals for we are criminals towards our descendants and to future generations. When we go to the Northwest we see that people first settle upon land that has not a tree upon it, then they take scrubby land and then wooded land. Our settlements under the plan we have been outlining, will continue to be of that nature. We shall not only have settlements on the lands that are most fertile and the lands that require the least trouble on the part of the settlers, but we shall have settlements with compact population. And when we have peopled those parts of Canada and improved the land, we shall have conditions in which a man may put his breast against the forest and try to hew a home out for himself in a situation that is more difficult. We have this enormous advantage over the United States that we have still plenty of land while that country exhausted all its cheap lands some time ago. When the United States could no longer give a homestead to a man it had to turn around and irrigate a part of the country, of which, I heard its chief geologist, Mr. Haydon, say as late as 1878, that one-third was absolutely unsuitable for man. Within fifteen years the government of the United States was, through irrigation, endeavouring to make

that large portion of the country suitable for man. We desire to protect these vast northern forests for the Canadian of the twenty-first century. And if we do so, we need never have a doubt that when he turns his mind, his energy, his enthusiasm, his interest and his purpose in this direction he will have a chance to expend on virgin resources of untold value the energy that is characteristic of the Anglo-Saxon race.

AUSTEN CARY,

ASSISTANT PROFESSOR OF FORESTRY, HARVARD UNIVERSITY.

The gentleman who has just spoken has left us in such an atmosphere of peace and goodwill that it seems a pity to introduce anything that partakes in the least of a controversial nature. Controversy, indeed, is far from my intention. When, however, a man's occupation has been touched on and the subject to which he has recently given months of pointed thinking, he will perhaps be forgiven if he states plainly just what he thinks.

There are now three established and well known schools of forestry in the United States. One of them, the Yale school, has been represented here by Mr. Pinchot. Dr. Schenck, the head and front of the Biltmore school, is also among us. The third school of professional forestry is at the University of Michigan. Head of that is that sterling man known to many at this convention, Mr. Filibert Roth. He isn't here to speak for himself, and so it gives me particular pleasure to say that in my humble judgment sufficient time spent under Filibert Roth will be as likely to make an efficient forester as any course of education now available.

That there is a course in forestry at Harvard University is perhaps known to few here. It has, however, been in operation for two and a half years, and it so happens that in the process of expansion I have been entrusted with the instruction in lumbering.

Instruction in lumbering is pretty nearly a new thing under the sun, and there are still those who between lumbering and forestry can see no essential connection. In the United States the botanists represented forestry for a long time, and there are still those who say that forestry is nothing but applied botany. Then came the principles of silviculture: growth, reproduction, and the light and soil requirements essential for growth. These ideas ruled education for a time. Men were turned out by our schools full of these valuable ideas and of enthusiasm as well. They have educated the country and started lots of valuable work, but they were weak on the side of actual woods operation, and it is a fact that when they ran up against the problem of actual management they frequently fell down.

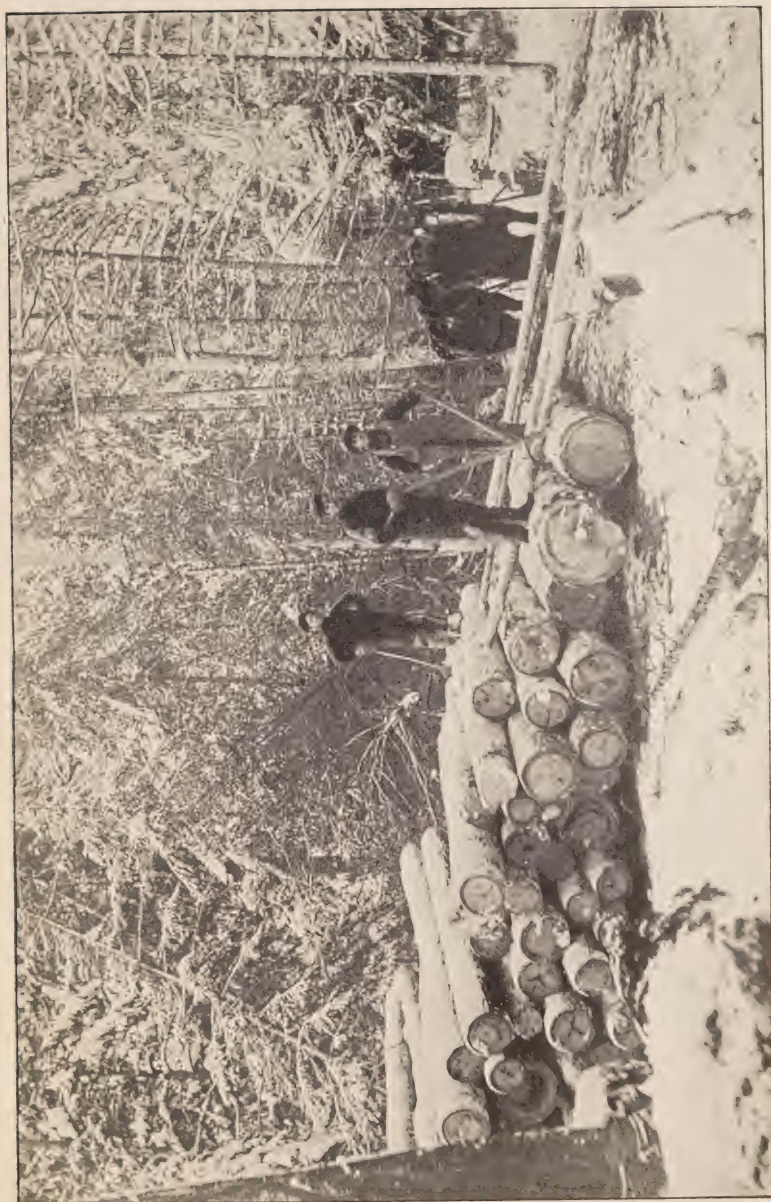
What ideas I have on the subject are mainly derived from six years' service as forester in a lumber business. Without great knowledge of lumbering I went into the business as a subordinate and side issue, to see what could be done by careful and conservative cutting to maintain the growing power of the land. The first thing I learned was that I couldn't get things done as I wanted them; and when I looked further to locate the cause, I found it oftentimes inherent in the logging methods, methods which were habitual in the country, methods oftentimes which with due regard to cheapness of operation could not be changed. But the main point is that

with, a passing knowledge of lumbering to start with, better than most students of forestry at graduation possess, it took me three years to get my bearings in the situation I held, to see the relations of the logging methods with the purposes I was there to carry out.

I have thought over this matter a great deal—have questioned what place the forester ought to have in a big lumber business—and the only conclusion I can arrive at is that he ought to run the whole thing. Forestry is a practical science. In business it can only expect to secure measures that will actually at some time pay. Woods operations ought to have, and must have, two main purposes: first, cheapness; second, maintaining the growing power of the land. The man to carry out those two purposes, a work oftentimes of balancing and compromise, ought to be the same man. He ought to be the man in direction of the whole thing. And so the object of effective forestry education, as I have conceived it, should be to train men for actual business management, at the same time informing them on the silvicultural side, so fixing the principles of forestry and forest production in their minds that during the wear and tear, and through the temptations of business life, they never will forget it. Men so trained, when they get their footing, will command the situation. They won't have to beg for the interests of growth and reproduction. They will value these things at their true rate, and when the chance comes simply see to it that appropriate measures are carried out.

Is this a practicable scheme? Several have said here that this forestry question must be settled on economic grounds and by economic means. That is easy to say in general terms. The thing remains to pick out the vulnerable point with certainty, and then effectively attack it. Personally I believe the situation is open to attack in this direction—that there is abundant opening in the lumber business for properly trained men. Listening to Senator Edwards yesterday, you may not have thought so. He says he has often received letters from foresters asking for employment. He replies by asking them what they think they can do for him. They say sometimes to help him protect his limits, and his answer is that he knows vastly more about that himself than they do.

I have heard talk like that many, many times. Years ago I heard it when I started into forestry, and I can hear it now any day I want to by going to the right place, but it doesn't dash me any more. In the twelve years that have elapsed since I committed myself to the profession, I have seen too many times, and on too big a scale, on how unsound a basis that self-confidence often rests. American business men may be less sharp and intelligent than Canadians, though I do not understand their reputation to be such; and, speaking in the line of forest protection, I have often seen whole valleys and townships of timber on our side of the line go to destruction right under the eyes of the owner, but without his knowledge or concern, to be dashed by talk like this. I know this in particular—that my old employers are several hundred thousands of dollars richer because their foresters knew what a timber beetle was, and how to fight it; and judging from that I say it is just possible that if Senator Edwards would take one of our bright young fellows up into his woods he might learn something that he would give a great deal to know. Please understand that I do not undervalue experience. The lumberman's knowledge, and his seasoned tem-



ROLLWAY OF WHITE PINE ON J. R. BOOTH'S MADAWASKA LIMIT.

perament and force are valuable resources, and they cannot be acquired in a day. But scientific training does not unfit a man for the acquisition of these things, and that contributes, unless I am greatly mistaken, a valuable element to the final efficiency of the man.

Further, I am willing to take the old lumberman on another ground, that on which he is most cock sure. The amateur going to a logging camp to take a few photographs and perhaps write it up for the papers looks on lumbering as a wonderful trade. And talking with the lumberman himself, he gets that impression confirmed. The difficulty, the mystery, the peculiar value of experience, and the attainments of the old experienced man,—these are things which one is pretty sure to hear a good deal of.

Here, again, in going by experience had on the other side of the line, I may be doing injustice to the men who conduct the business here. But what I want to say, properly limited as to locality, is this—that if a man with fit attainments and observing powers will stay long enough in the woods to really learn logging organization and methods, he will find there a great deal, right in that very field, that is capable of improvement. The spread-out condition of the business accounts in part for this. The big profits involved in the business in the past helped also because they make small economies look mean. A main factor, however, has been the lack of scientific training in the men who had the work in charge. Old habit rules too strongly; work is done by rule of thumb; there is no means of surely handing down from one man to another the results of experiment.

To put more definitely what I believe to be true in this connection, I will say that the lumber business, as I am acquainted with it, grossly wastes valuable material, that it is too loosely organized in proportion to the value of the product and for the good of those who are financially interested in it; that its methods are very uneven, often costly and behind the times. Lumbering has lacked in a word the services of the production engineer, the man who studies methods, costs, and sources of waste accurately, and devises means in accordance therewith.

And right here, as I look at it, is the opening which forestry, if it is wise enough, may utilize to its own advantage. Why should not forestry be one of the regular engineering professions? Here seems to be economic gap enough. Why not jump into it? Why should we not furnish to the lumber business the best surveyors, explorers and business managers, and at the same time that they are receiving their engineering training fill them so full of forestry, its principles and its importance to the country that they will always be on the watch to forward it. We have heard already practical training commended. Yes, by all means, but we want men of theoretical training and of high ideals, too.

That such men will abundantly prove their value I, for one, do not doubt. All they ask from timber land owners is a chance to show what they are worth. Numbers of such men, indeed, graduates of our various schools, are now bearing varied responsibilities in many of our states. And, indeed, from the type of men I see before me and what I have heard during the progress of this convention, I feel sure that when a forests school is started in Canada, it will be on some such broad and substantial lines.

DR. JAS. FLETCHER,

DOMINION ENTOMOLOGIST AND BOTANIST.

I have, perhaps, about two minutes to bring before you some very interesting specimens of (*Eucalyptus*) wood grown at Victoria, B.C., by Sir Henri Joly de Lotbinière, showing the growth of one of his favourite trees. This section of wood (exhibiting section of wood) is interesting, scientifically and economically. It shows the large growth that has been made by certain tropical trees from Australia in British Columbia where they are just able to remain alive during the winter and keep up their character as evergreens. Some of the specimens that Sir Henri Joly de Lotbinière has grown have made the very remarkable growth of one inch every year since they were planted, and an interesting scientific fact about this particular tree of which I have the specimen here, is the secondary rings which are shown between the annual rings. There are three regular rings showing the annual growth, but each of these is divided by six or eight rings showing the sensitiveness of this tree to the climate, the tree not being yet quite acclimatized. Sir Henri has some trees that show a diameter of four inches, which is equivalent to the growth of the quickest growing tree we have in Canada, the American white elm. You remember Dr. Saunders told us yesterday that the American white elm made a growth of 14 inches in ten years. Sir Henri has found that the *Eucalyptus*, the seed of which was obtained in California, has stood the winters and is making a remarkable growth. Some trees are 30 feet high. Sir Henri, being unable to be present and desiring to be in touch with this convention, asked me to exhibit these specimens as some evidence of the work he is carrying on in British Columbia. His name is already well identified with the culture of trees in Canada, and this is but another proof of the very great interest that he has always taken in silviculture in Canada. His growing of the black walnut at Pointe au Platon many years ago has introduced to many of us a tree which has produced greater results than were expected from it.

I will crave the indulgence of the convention to draw attention to one subject that was also referred to by you, Sir Wilfrid, in your opening remarks. I have no intention of imposing on the audience a long address, but I should not like this magnificent convention to close without drawing some attention to a subject of very great importance to every one who takes an interest in forestry or in growing trees to make use of them for the market, for shade, or even for æsthetic purposes. We recognize that enormous losses take place every year, not only from fire which we are considering at this time, but also from the many kinds of injurious insects which attack and destroy trees, especially when they have been wounded or weakened whether by the lumbermen's axe, or by fire or lightning. Directly the trees are injured they become a prey to these scavengers of the forest which remove them to make room for something more useful. To speak merely from the economic and lumbermen's point of view, these are injurious. If these trees are of no use, then let fire and insects destroy them; but, if they are of use, we should do all we can to preserve them. We find that there are means of preventing this destruction, and it is our duty to make use of these means. There are people working all the time to prevent this great loss; theories have been built up and exploited as to the way in which these insects should be dealt with, and methods have been advanced by which the injury can be reduced or obviated. You

have in Canada men who are working these problems. At the experimental farm there is the Dominion division of entomology. At the agricultural college at Guelph there are also trained men at work devising means to prevent this loss. The only statement I make at this grand forestry convention, is that the loss can to a great measure be prevented by the application of scientific knowledge, and I only wish to remind you that there are men working at these problems. I hope that the lumbermen, the foresters and all those interested in trees will make use of those officers whom they are paying to do work for them.

PROF. PENHALLOW,

MCGILL UNIVERSITY.

The lateness of the hour precludes the possibility of my saying more than a word or two with respect to the educational aspects of the work you are concerned in here to-day. In representing the interests of McGill University at this convention, it is my privilege to convey to Your Excellencies and Sir Wilfrid Laurier, the assurance that it is in full sympathy with the work which this convention has so well performed; while it is fully prepared to give assistance and encouragement at such times and in such ways as it may be proper to do, to any measures which will tend to promote forestry education in Canada.

McGill University has watched with the keenest interest, the progress of the Forestry Association from the very earliest days of its existence when Mr. William Little first undertook to inaugurate that movement which has culminated in such magnificent results as those which have been achieved by this convention during the past three days. We have been aware that this association has exerted a strong and steady influence for the benefit of the forestry industry, but the proceedings now being brought to a close have been a revelation of work accomplished far beyond the expectations of those who were not intimately associated with the work.

One of our chief sources of gratification in the progress of the present proceedings, has been to observe the sustained interest which Your Excellency has exhibited, and also the decided way in which you have recognized the importance of the great problems which have to be dealt with; a satisfaction which is also increased by the very liberal, far-sighted and statesmanlike policy which you, Sir Wilfrid, have laid down the lines upon which future legislation may be carried out. Furthermore, our gratification is intensified by the fact that the Hon. Mr. Borden has, on two separate occasions, assured us that the opposition will contribute to the support of our work here, and that the great problems which now confront us, will be dealt with in the legislative assembly without reference to political divisions. This we may regard as one of the greatest triumphs of this convention.

With respect to the educational aspects of the questions discussed here, it is difficult for me to add very much to what has already been said so well and so fully by Dr. Clark and by Mr. Cary, both of whom have gone to the very root of the matter; but perhaps I should add one or two thoughts which have been constantly in my mind during the progress of the discussions. Much has been said about the importance of practical education for the forester. It has even been suggested that tech-

nical education is not required. As one who is deeply concerned in the educational aspects of such questions, it is of course, necessary for me to dissent from such a view. I look upon the foresters as an organized army with respect to which the man in the forest may be regarded as the common soldier. He must be trained and trained thoroughly. He must know his duty from the beginning to the end, but such a unit is in no sense efficient unless it has the guiding which may be exercised through a superior officer. And so all the way through rank and file, we must ascend through the various grades from men to officers and officers to the general who is the guiding spirit, in whom is concentrated all the controlling intelligence of the forces in the field. From this point of view we find it absolutely necessary that there should be the most efficient technical training, otherwise the unit in the forest becomes useless in the absence of a superior force. This idea has been emphasized and elaborated so well and so fully by Mr. Cary, that there is little or nothing more for me to say at the present moment. There is nevertheless one factor to which I would like to draw attention for a few moments before sitting down, and it is this: Much has been said about the importance of our forests from the economic point of view. That, of course, we cannot in any sense deny, nor would we wish to. But there is another aspect of the question which, to my mind, has not been sufficiently dwelt upon. In his recent address, Mr. Walker did allude to it more at length than any other speaker whom I have heard. It has been referred to incidentally as the esthetics of forestry, but what I would like to emphasize more fully is the fact that the forest has a deep and far reaching moral relation to any community which may be in its neighbourhood. When we view any country and consider its various physical conditions, we observe that there are striking and often profound differences existing between the various communities which inhabit it, and such differences become more pronounced in any comparison of widely separated countries. Further study shows that these differences are directly related, not alone to climatic conditions, but to topographical and other features relating to the general surface, and particularly to the character of the vegetation and to the presence or absence of forests in particular. For while climatic conditions and topography furnish conditions of environment which unquestionably influence the physical well-being of man in important ways, it is no less true that the esthetic environments also contributes in equally important ways to his higher and moral well-being. This idea has been brought to my mind very frequently in recalling the fact that something like 1,100 years ago the religious orders in Japan introduced the elements of forestry when they attempted to adorn their temple grounds with trees and gave to the latter a definite status as factors in the moral elevation of the people. At first established from religious motives, the love of trees and of the forest which has now taken deep root among the people throughout Japan was later transferred to the community at large and invested with a certain degree of practical value while the moral effect was not lost sight of. With this simple starting point, and through a natural process of development, the Japanese have been able to elaborate a perfect system of forestry which, as the Minister of Agriculture will be able to tell you, is in the fore rank of the forestry methods of the world. So I feel with Mr. Pinchot, that we strike the key-note of a comprehensive forest policy when we say that that policy must be so framed as to give the most agreeable surroundings and *insure to the rural districts, the existence of contented homes.*

For if you have contented homes you have the body of public sentiment with you, and you have the best of all guarantees of hearty and sympathetic support in any legislation which it may be desired to enact in the further interest of the forests; for in a discontented community it would be impossible to effectively carry out any liberal policy.

PROF. HENRY MONTGOMERY,

TRINITY COLLEGE, TORONTO.

As a representative of Trinity College, I desire to thank those who have had this convention in hand for the opportunity of expressing before the public our strong sympathy with the objects and aims of this convention. I have been greatly pleased during the past three days with almost all of the proceedings of this convention. It is hardly necessary to make this statement; but, we feel the necessity of enlisting the aid, as far as possible, of public opinion, which, of course may be necessary for the support of any legislation or any action undertaken in this country for the preservation of the forests, the increase of tree planting and the like. Consequently, I am thankful for this opportunity of expressing the great interest and deep sympathy of the authorities of our college.

I have noticed a disposition to blame those who have cut down the forests in this country in the past. That is something which has been alluded to, and I am not quite clear as to the exact attitude of the convention towards this subject. There is no use in blaming our forefathers. They came here and they had to encounter difficulties and hardships. We all know something of them. It is hardly necessary to refer to them. My own parents, some years before I saw the light, came to Ontario from across the Atlantic, looked for good land and found it in the county of Durham. There were only three families then in the township. The country was densely wooded. They had to go thirty miles to have their wheat ground, and that, of course, means something. In endeavouring to reach her sister's residence, my own mother lost her way in the forest and she was some three days and nights in the forest before she was found. When she returned home she simply rested and went on her journey. I refer to this simply to remind those who have not thought over the difficulties and hardships for which we ought to give great credit to our forefathers, that it would perhaps be well to endeavour to repress any thoughts of blame or discredit we might have to attach to the people who settled this country.

But, I am not sure but that it would be a good thing if we did find a little fault with the people at the present time. Perhaps we might do good work in stirring up a little more interest amongst the mass of the people, the multitude at large, by finding fault with them. I have lived for years on the western prairie and I know something of the want of trees there and the results of tree planting. I have also lived for years where irrigation is practised in the southwestern states and I have probably discovered some traces of irrigation works constructed by a people who lived long before our time, a pre-historic people of some two or three thousand years ago. Others have discovered them also, and perhaps you have heard of the great difficulties which the prehistoric people there had to overcome in order to secure water for their land. We have found the evidences of their having cut through solid rock to bring the

water and distribute it upon a country which seems now like a desert, but which once supported hundreds of thousands of people. I have also resided in Toronto and vicinity for a good many years, and I am almost daily reminded of the need of education in such subjects as this. I find people going to the beautiful Scarborough Heights just east of the city upon which are growing different varieties of our native trees and shrubs. They purchase a little piece of ground. The first thing that most of them do is to cut down everything. They will sometimes make a small green space and endeavour to grow the geranium which is not capable of reproducing its kind; but, they fail to protect these beautiful trees and shrubs. If one is allowed to remain, it has to fight for its very existence. They pluck off the branches and tear the shrubs up by the root and throw them down again. This sort of thing goes on in the suburbs of many of our towns and cities from day to day and year to year, with the result that in many places the native woods and scenery are entirely disappearing.

I think that perhaps too little has been said on this subject in this older settled part of the country, and I would like to see a very much greater interest taken in Ontario at least in nature study in the schools. I was very much impressed with the reference of Mr. Pinchot to this matter. He said they expected to go right into the schools. As a matter of fact, in many states of the union they have gone into the schools long ago, and nature study has been developed to a point beyond anything we can find in Canada. There are those who tell us, that, by putting that in the curriculum we are burdening the pupils. It is not necessary to do so. It will make the education of the pupil more attractive and practical, easier and more useful. I also see the necessity for these studies in the schools because of the necessity for culture, if you like, for esthetic purposes. One gentleman remarked that the forests were of use only in so far as they made prosperous homes. I agree with him entirely, but I do not see how human beings can be very prosperous unless the whole individual is developed as far as possible. If we stop short at the money point, at the dollars and cents, we shall fall far short of the development of the entire man, and the state cannot afford to neglect this consideration. As a parting word I would like to impress this matter of education upon the convention. If we can get the people, especially the young, interested through schools of forestry, through public schools and other schools, then we shall have accomplished a great deal. We will have the sympathy, support and confidence of the whole people. I thank you, and desire once more to say that you may depend upon the support of the educators and educational institutions of Toronto.

REV. THOMAS HUNTER BOYD.

SECRETARY OF THE ST. CROIX FARMERS' INSTITUTE, WAWAIG, N.B.

Perhaps the justification for my addressing you this afternoon is that New Brunswick has been the first among the provinces to follow the example of Sir William Macdonald in the establishment of consolidated schools in which special provision is made for nature study and manual training. Both of these studies are intimately associated with the object which has brought this convention together. Further, we have quite a number from that province who have contributed to the

understanding of this subject—amongst them Prof. Bailey and Mr. Edward Jack, who wrote upon the trees of the province; Dr. G. U. Hay and Mr. James Vroom, members of the Forestry Association; and Prof. Ganong, of Smith College, Northampton. We are proud that we have not only produced very abundant woods, but that we have produced men who are competent to describe so adequately and so beautifully their several characteristics. New Brunswick is not represented on the programme this year to the same extent as the great west. Our needs it may be, are not so evident as those of some other portions of the Dominion. I am present as an interested observer—not in any sense as a representative of the province.

While the name of convention has been given to this great gathering, to some of us it has been very much like a Dominion university. Now we have come to the valedictory. And after the university what? Surely, the university extension.

When the government seeks information on forestry matters, such as is ordinarily gathered by commission, it will, doubtless, find it available in the proceedings of this convention. One ventures to suppose that it will not be very long until this gathering will be modelled upon the plan of the British Association; when, instead of meeting in one room, as we have done during the past three days, there will be different sections—one for the education aspect, one for the æsthetic aspect, one for the railway aspect. These various sections meeting separately, the members will have fuller scope for the discussion of the several subjects; and we shall all reassemble at the close, as in a congress of one of the great scientific societies.

In connection with what we may be allowed to call the closing exercises of this great university, I am reminded of the very beautiful errand upon which Her Excellency the Countess of Aberdeen went from Ottawa some eight years ago, when a man whose loss we all deplore, the late Dr. Harper, invited her to deliver the convocation address at Chicago University. The university conferred upon her a degree; and, in responding, the Countess of Aberdeen said, 'The measure of our opportunity is the measure of our responsibility.' I feel that that expression summarizes the attitude of us all, in regard to the great privilege we have enjoyed during the past few days.

I disclaimed representing the province in which I reside. May I speak on behalf of the young boys, who will plant the trees of the future, or take care of the trees that shall be left after the work of destruction? And, if I may make a plea for them, I think it should be, not that we shall add a new subject to the curriculum of the common school, but that we may have

} 'The sound of a bell in a wood.'

Some one may tell me that this expression is only poetry; but I think it is a very beautiful expression. I am not asking for the introduction of a new subject, but of a new principle—for 'the sound of the bell in the wood'—something over and above the ring of the woodman's axe, and something more than the whizz of the saw and the sounds that are usually heard when men are engaged in lumbering. Let forestry introduce the poetic element.

In order to reach this end, I would venture to ask that those present who are interested in the matter of education will not only endeavour to insure the co-operation and support of the great corporations and societies which they here represent, but will take an interest in the rural schools, in the men who have not had the privilege

of getting this information which we have received, and in the non-reading farmer. These very men, the uninstructed and the non-reading, not infrequently wield the axe in districts that are strategic points—where the watershed or the scenery is the chief asset.

I quite understand that there is much information—more than most of us are aware of—sent out in the form of bulletins, circulars, and such material as the press may supply from time to time; but I would like to plead in behalf of those who cannot read—and, unfortunately, we have thousands of them—for simple material—material such as was distributed in abundance from Cornell University—and I am proud to say this, because I have been under obligation to Prof. Fernow, of Cornell, for material that cannot be obtained in this Dominion—a simple pamphlet with a picture and some brief explanation, which might be made to flood this country, very much as political campaign literature is made to flood it. I think that we should use persuasion, rather than legislation; and that we should seek to co-relate and co-ordinate this subject with others in the curriculum of our normal schools.

RESOLUTIONS.

Mr. E. STEWART presented the following report of the Committee on Resolutions:

Your committee has had submitted to it by various gentlemen a number of suggestions expressing their views upon matters of importance and has considered the same and now submits for the information of this convention a series of resolutions which in its opinion cover the objects properly within the scope of this convention.

1. *Resolved*, That the time is now ripe for a general forest policy for Canada and that the Federal government be asked to inaugurate the same.

2. *Resolved*, that this convention would urge the importance of the exploration of the public domain in advance of settlement with the object of determining the character of the lands so that settlement may be directed to those districts suitable for agriculture and which give promise of the possibility of the establishment of permanent and prosperous homes for the settlers, and that the lands unsuited for agriculture should be withdrawn from settlement and permanently reserved for the production of timber;

That this convention approves of the policy of forest reserves adopted by the Dominion and provincial authorities and favours the extension of such reserves, as may be found practicable from time to time, so as to eventually embrace all lands suited only for the production of timber;

That in the administration of such reserves this convention would approve of the policy of having the cutting done under the supervision of properly qualified officers and that in such operations due provision should be made to insure the reproduction of the forest.

3. *Resolved*, that in view of the great saving of timber throughout the Dominion which has been accomplished by the fire ranging staffs organized under Dominion and provincial authorities, this convention desires to place on record its approval of the establishment of a fire ranging system for the protection of the forests, and to urge that this system be extended to all forested districts as far as possible, and that, in view of the great interests to be protected, the service under such a system should be made as complete and effective as possible. In this connection this convention desires to call public attention to the small expenditure made for the protection of the

timber resources of the country in proportion to their value when compared with rates of insurance paid on other public property.

4. *Resolved*, that in view of the many important respects in which the water supply affects the industries of the country, in particular, agriculture, irrigation and manufacturing, and the increasing value of the water powers owing to the adoption of electricity for industrial purposes, this convention would urge that special means should be taken for the preservation of the forests on watersheds so as to conserve throughout the year the equable and constant flow of the streams dependent thereon.

That in view of the large expenditure made on irrigation works in southern Alberta and the intimate relation of the flow of the irrigation streams to the forests of the eastern watershed of the Rocky Mountains this convention would specially urge upon the government of the Dominion the necessity for the protection of the forests on this watershed.

5. *Whereas* in the older settled districts of Canada conditions are now such that great benefits would be derived by the country as a whole from some systematic movement to re-afforest large tracts of land which at present are lying waste in the agricultural districts; and,

Whereas farmers as a rule have no expert knowledge as to the cultivation of trees and find it almost impossible to obtain nursery stock of forest trees at reasonable prices and of good quality for planting purposes; and,

Whereas the farmers of the country are, if properly informed, the right class of people to undertake tree planting in the agricultural districts; and,

Whereas the scheme at present in operation in the west, carried on under the Dominion government, which provides for the free distribution of forest tree seedlings and instruction as to their cultivation, has given satisfactory results;

Therefore resolved, that this convention would urge the governments, both federal and provincial, to take steps to encourage as far as possible, both by instruction and by giving facilities for obtaining nursery stock suitable for afforestation, a more general interest in tree planting, especially on such lands as are at present unfit for ordinary agricultural purposes, and we would further urge the Dominion government to make, if possible, further efforts in this direction in the prairie regions where the results from tree planting are bound to be of inestimable value to the whole country.

6. *Resolved*, that especially in view of the proposed construction of a new trans-continental railway and the projection of other lines passing largely through coniferous forests, the attention of the government of the Dominion and the provinces and also of the railway companies, be called to the serious danger of loss of valuable timber consequent upon the construction and operation of lines so located, if all possible precautions to prevent the starting of fires are not taken; it be urged that the question be given full and careful consideration;

That to the end sought the railway companies constructing such roads should be required to furnish an efficient equipment and control to prevent fires;

That at such seasons as may be necessary it be required that an efficient patrol be established along the afforested line of railway, whether under construction or in actual operation;

And further that the officers both of the governments and the railways be required to use all possible diligence to prevent the starting or spread of fires through defective equipment or through the carelessness of the operations or negligence of the employees under their control.

7. *Whereas* it has been the common method in lumbering over a large portion of the timber area of Canada to fell trees by the use of the axe;

And whereas it has been found that trees sawn close to the ground can be felled more cheaply than those cut down with the axe, resulting in a gain of from six to

ten per cent in the scale of the logs and diminishing the risk of fires caused by chips in felling;

And whereas the felling of logs after the season of snow has resulted in a large loss to the forest of Canada;

Therefore resolved, that this convention recommend to those who are in control of the public lands of Canada the advisability of making such regulations as will carry out the principles of this resolution.

8. *Resolved*, that this convention is of opinion that the retention of rough areas under wood and the replanting of areas unsuited for agriculture would be encouraged if some action in the direction of relieving the same from taxation could be put into effect by the local governments and the municipalities.

9. *Resolved*, that the government be, and is hereby requested to place forest tree seeds imported for afforestation purposes on the free list.

10. *Resolved*, that the thanks of the convention be, and is hereby accorded to the press of Canada for invaluable services in rendering its work so eminently successful and for the sympathy and support it has always given the forestry movement of the country.

11. *Resolved*, that the thanks of this convention be tendered to the railway companies for their kindness in granting reduced rates for the convention, thus aiding materially towards its success.

The following resolution was read by Mr. J. Fraser Gregory, of St. John:—

We, representatives of boards of trade throughout the length and breadth of the Dominion, delegates to the Canadian Forestry Convention in session assembled:

Resolve that we heartily approve the interest taken by our national government and the premier, Sir Wilfrid Laurier, in calling this convention and the assurance we have that the preservation of the forest shall receive the great attention it requires and demands.

That we will report to our various boards the valuable lessons we have learned, and have them each and all impress on their provincial governments the advisability of following the example now set by the federal government in taking steps to protect, conserve and perpetuate their forests.

Mr. JOLY DE LOTBINIÈRE moved:

Resolved, that the grateful thanks of this convention are hereby tendered to His Excellency the Governor General for the great interest he has manifested in the work of forestry and for the sacrifices he has made in order to be present at the sessions of this convention.

SIR WILFRID LAURIER.—Ladies and gentlemen, I suppose it is sufficient to put this motion to have it carried. Therefore I have much pleasure in conveying to Your Excellency the thanks of this audience for the interest you have taken in the movement, and my own as well.

FATHER BURKE moved the following resolution:

Resolved, that this National Forestry Convention gratefully places upon record its keen appreciation of the eminent services rendered to the great interest which it represents by the Right Honourable Sir Wilfrid Laurier, Prime Minister of Canada, in convoking the convention itself and presiding so admirably over its important deliberations.

Motion agreed to.

FATHER BURKE.—I have pleasure in tendering you, Sir Wilfrid, the hearty thanks of this convention for what you have done and for what you have still to do.

SIR WILFRID LAURIER.—Your Excellency, ladies and gentlemen, the action which you have taken in closing this convention—this very successful convention—is altogether too kind. In being the convenor of this convention I not only followed the promptings of my own heart but still more my deliberate conviction that it was the best means of calling public attention to this most important subject. The response that has been given has exceeded all my expectations. Our labours are now at an end, we have now to disperse and I am almost sorry to have to pronounce those words. These days have passed away too rapidly for me altogether. I am a pretty busy man, but still I became more and more absorbed in the work of the convention as I followed its labours from day to day. We are dispersing now. Our labours are at an end—no, I am mistaken, our labours are just commencing. It is not sufficient for us to say that we have done our work, that it is completed. Again, I repeat, it is only commencing. We have worked as a collective body. It becomes every one of us now to work individually and singly and I desire every man in this audience as he goes away to his home and to his own avocation to become a missionary in the work of forestry. It is not sufficient that we should feel strongly upon this subject. Unfortunately we have to remember that the Canadian people at large have been too indifferent in the past to it. We must interest the nation, interest the individual, the farmer, the settler, the lumberman, everybody in the great work which is involved in forestry. Now, ladies and gentlemen, my last word is that this convention is at an end. It is closed to be convened some time later on.

The convention was closed with the singing of God Save the King.

EXCURSION TO MADAWASKA.

On Saturday the Grand Trunk Railway Company kindly placed a special train at the disposal of the delegates and a trip was made to Madawaska to visit the timber limit of Mr. J. R. Booth, in accordance with his invitation. The weather was perfect, and a walk through the woods was thoroughly enjoyed. A large pine was felled by the axe so as to show the visitors how it could be done. The tree was about two hundred years old and was cut down in four minutes. Some time was spent in exploring the shanties and the guests then sat down to a regular shantyman's dinner. This was so thoroughly good in every way that it evoked three cheers for the cook.

At the conclusion of the dinner, Earl Grey proposed the health of Mr. J. R. Booth, the host of the gathering. Mr. Booth, he said, is a character for whom he has the greatest admiration. He was a successful pioneer starting out fifty years ago with an idea. He commenced buying red and white pine and afterwards built 400 miles of railway, 200 of which had been constructed without government assistance. Earl Grey continued that he had heard with the greatest admiration that Mr. Booth had built a railway through a forest area without having a forest fire and had operated the road without having a forest fire caused from a locomotive. The speaker hoped Mr. Booth's example in this respect would be followed by others about to build railways throughout the Dominion. The people could look with admiration to the man who had united theory with practice—General Booth with his Salvation Army of Forest Rangers.

Mr. J. R. Booth, in reply stated it had given him great pleasure to afford the Governor General and the other members of the party the opportunity to see one of

the forests of the country. This limit, he said, was one of the first pine countries he had ever owned. In the old days it used to take three days hard driving from Ottawa to reach the limit and a return trip by team would take seven days. Now he had been glad to be able to put people on the limit in five hours from Ottawa.

'When this tract was put up for sale about fifty-one years ago, after the death of Mr. John Egan, its former owner, I told the auctioneer,' continued Mr. Booth, 'that no matter what bid was made the last bid was to be mine. I raised no voice. With bidding in the vicinity of \$35,000 some one said the price was too high, but finally I paid \$10,000 more and bought the limit. Afterwards, the very man who had said the price was too high when the bidding was about \$35,000 offered me \$10,000 more than my bargain. A friend of mine in Ottawa advised me strongly not to refuse the \$10,000, a clear gain, but I told him I knew enough not to take \$100,000 for the limit,' Mr. Booth then told of how he had gone to a bank manager and made the necessary financial arrangements to buy the limit. 'At that time,' he said, 'the limit, a tract of 270 square miles, was in a state of nature and though it and the owner had stood considerable hacking since, it contained a wealth of timber every one did not realize, and has on it the largest body of pine timber of any area on the Ottawa river. A season's take out had never amounted to less than 150,000 logs and sometimes had gone up to 300,000.

'If fires are kept out of the forests,' continued the speaker, 'there will be more pine in this country 100 years from now than there was fifty years ago, and we shall have lots of timber for the generation to come.' As well as preserving standing timber, the government, he considered, should look after the country burned over and cut over and not fit for cultivation. Such a step would be productive of more wealth in the growth of pine.

OTHER TOASTS.

Mr. R. L. Borden, M.P., in responding to the toast, 'The Ladies,' also paid a tribute to Mr. Booth's work in building up the country—a work done quietly and successfully.

The toast 'The Canadian Forestry Association' was replied to by Messrs. E. G. Joly de Lotbinière, president, E. Stewart, Dominion superintendent of forestry, and R. H. Campbell, secretary of the association.

Earl Grey in another short speech said he was pleased at the idea of American and German experts taking part with Canada in the forestry convention. There was a feeling of gratefulness for assistance in the matter from friends across the line and this gives an idea of the time when every nation will vie with each other in promoting mutual interests.

Dr. Schenck, of Biltmore, North Carolina, and United States Consul General Foster spoke in reply to the Governor General's remarks.

The speech making continued on the train on the return journey, those taking part being David MacLaren, Geo. A. Putnam, Dr. Judson F. Clark, E. J. Zavitz, Norman Wilson, M.P., Gordon Edwards, Frederick Cook, A. Dickie, Austin Cary and Hon. F. J. Sweeney.

Before dispersing on the arrival of the train at Ottawa, three cheers were given for the Grand Trunk Railway and for Mr. J. R. Booth, for their kindness and hospitality.

LIST OF DELEGATES TO THE CANADIAN FORESTRY CONVENTION,
HELD IN OTTAWA, 10TH, 11TH AND 12TH JANUARY, 1906.

- ALLAN, J. D., Toronto Board of Trade.
 ALLNATT, PROF. F. J. B., University of Bishop's College, Lennoxville, P.Q.
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 ARMSTRONG, J. S., C.E., Rothesay, N.B.
 ARMSTRONG, L. O., Canadian Pacific Railway, Montreal, P.Q.
 ANDERSON, W. J. Ottawa, Ont.
 AVERY, F. W., Ottawa.
 BAILEY, PROF. L. W., University of New Brunswick, Fredericton.
 BATHAND, DR. L. C., President of Board of Trade, Sherbooke, P.Q.
 BALLANTYNE, R. M., Montreal Board of Trade.
 BARROW, E. G., City Engineer, Hamilton, Ont.
 BEAUCHAMP, B., St. Hermas, P.Q.
 BEATTY, H. J., C.E., Egan, Ont.
 BEECHER, C. M., Vancouver, B.C., Rep. of B. C. Lumber and Shingle Manufacturers' Association.
 BELANGER, Geo., *Le Soleil*, Quebec
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 BELL, DR. Robert, Acting Director Geological Survey, Ottawa.
 BEVERIDGE, Jas., Chatham, N.B.
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 BOOTH, C. Jackson, Ottawa.
 BOOTH, F. J., Ottawa.
 BOOTH, J. R., Ottawa.
 BORDEN, Sir F. W., Minister of Militia, Ottawa Ont.
 BORDEN, R. L., M.P., Ottawa.
 BOYD, REV. T. H., Waweig, N.B.
 BOYD, W. T. C., Bobcaygeon, Ont.
 BRAY, S., Ottawa.
 BREEN, Thos., C. E., Quebec, P.Q.
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 BRISSON, DR. T. A., Gen. Agent Montreal Colonization Society.
 BRODEUR, HON. L. P., Minister of Marine and Fisheries, Ottawa.
 BRODERICK, A. B., Manager Molson's Bank, Ottawa.
 BROMLEY, W. H., Pembroke Lumber Co., Pembroke, Ontario.
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